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IN THE DAYS OF COLONIAL ARTS AND CRAFTS

OUR WONDER WORLD

A Library of Knowledge

IN TEN VOLUMES

CHICAGO BOSTON
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THE UNIVERSITY PRESS, CAMBRIDGE, MASS.
THE BOSTON BOOKBINDING COMPANY, CAMBRIDGE, MASS.

VOLUME SEVEN

AMATEUR HANDICRAFT

I know that there is nothing better for them than to rejoice and to get good so long as they live: and also that they should eat and drink and delight their senses with all their labor. It is the gift of God.

THE AUTHOR OF ECCLESIASTES

EDITOR'S INTRODUCTION

I WISH every boy and girl could have the good fortune to be born well into a happy home, to live in the country for the first sixteen years of life, and to have from the outset free access to tools of all kinds. I wish those three conditions for all because they were my conditions, and as a result of them I had the happiest kind of a childhood, so happy that its afterglow floods all my manhood with joy, and tints for me all nature and all art and craft with rosy light. I realize that other conditions have made happy children and joyful men; but somehow I have a feeling that contact with love, and nature, and constructive life, at first hand, in one's earliest years, is a triple blessing of the highest potency. I wish every boy and girl could have it, anyhow.

But, alas, not all children can have it, in this stage of the world's development. Some children have but half of it, or a third of it, or perhaps even less. Having little or much, the conditions are never quite hopeless. The most potent thing in this world is an aggressive human spirit bent on self improvement. Absolutely nothing can prevent its growth. Like Truth "it liveth and conquereth forevermore." The harder the conditions the more hardy its growth! The storm that wrecks an indolent captain on the bars of Cape Cod, brings the alert and fearless captain into Boston Harbor a day ahead of time! As Carlyle once said, "There is always hope for a man that works; . . . but the kindliest Providence can make nothing of an idle man."

This volume has been made to encourage boys and girls to work with their hands. Hand work yields something books alone can never give. What one gets from books is like a lot of checks, good at a certain bank, or in a certain banking system, but not real money. What one gets by experience, by seeing for one's self, doing for one's self, is like a bag of gold, good anywhere and always the round world over.

No matter where a child lives, or how little he may have to start with, he can begin to gather tools and material of some sort, and to lay up within the gold of skill. He does not have to attempt great things, he has to do just the little things he wants to do most, but to do those things just as well as he can. Every attempt adds a grain of gold to his invisible pile; every success mints the gold into current coin. If "health is the first wealth," then skill is the second wealth.

In a book some two thousand years old is a passage in praise of handicraft that every boy and girl should know. Put into words that children in this twentieth century can understand, it runs thus:

"The book-knowledge of the scholar cometh by opportunity of leisure — and he that hath little business can become wise.

"But how can one become a scholar that holdeth the plough and that wieldeth the goad,

that driveth oxen and is occupied in their labors, and whose talk is of bullocks? He giveth his mind to make furrows, and is diligent to give his cattle their fodder.

"So every carpenter and work-master that laboreth with his hands night and day; and they that cut and grave metals and precious stones, who are diligent to make great variety, and to produce lifelike imagery, and who watch to produce a fine finish in all their work.

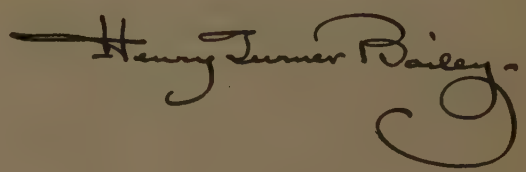
"The smith also standing by the anvil and considering the iron; the vapor of the fire wasteth his flesh, he fighteth with the heat of the furnace; the noise of the hammer and the anvil is ever in his ears, and his eyes look ever upon the pattern of the thing that he maketh; he setteth his mind to finish his work, and watcheth to polish it perfectly.

"So doth the potter sitting at his work, turning the wheel about with his feet; he must always have careful regard for what he doeth, making everything by number. He fashioneth the clay with his arm, and boweth down his strength before his own feet; he applieth his mind to glaze his work, and is diligent to make clean his kiln.

"All these trust in their hands; every one is wise in his own work. They cannot wander about like a man of leisure, nor live anywhere they please; all their desire is in the work of their craft. They are not found where parables are spoken, nor sought for where scholars gather; they go not with lawyers, they cannot make eloquent speeches, nor do they sit high in the congregation; but *without them cannot a city be inhabited; they maintain the state of the world.*"

It is well for young people to remember this, especially in these days when many have an ambition to live by words, and to deal with reality indirectly, as middlemen, exploiters of the labor of others, instead of productively and constructively. Every boy and girl should be skilled in some honest craft or trade, some form of manual activity that adds to the wealth of the world. They cannot begin too young to lay the foundation of their success by doing things for themselves with their own hands.

Times have changed somewhat since the son of Sirach wrote his psalm in praise of labor. The invention of the printing press, and of the means of rapid communication, have so changed the old conditions that a craftsman in these days need not be ignorant of the wisdom-literature, the poetry, and the fine art of the world. He may become wise while he pursues his craft. In fact there is no better approach to all the treasures of the race than through the door of a useful trade. And the walks that lead to all the doors of the trades start from the street, and the name of the street is Amateur Handicraft.



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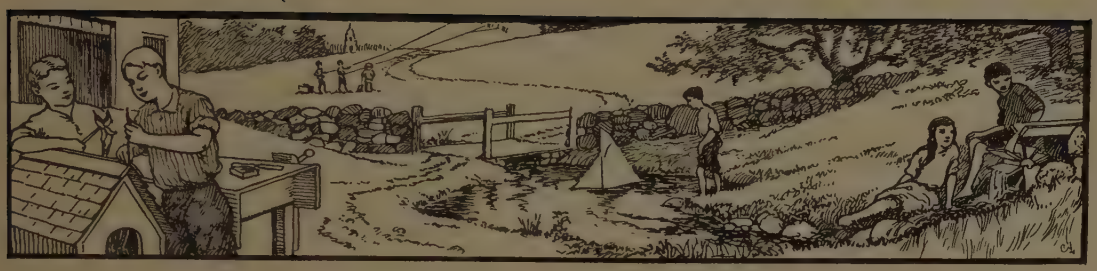
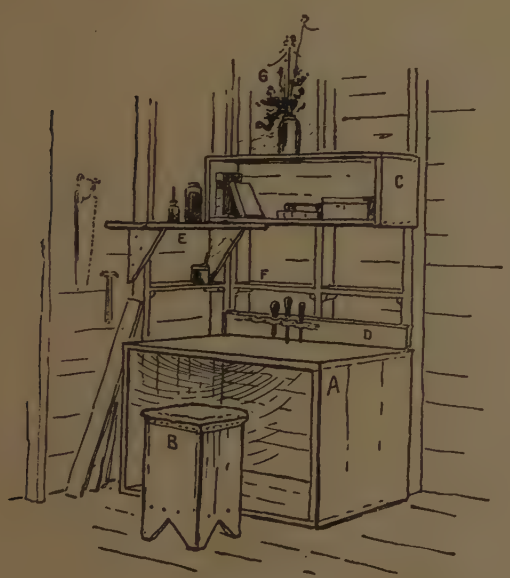
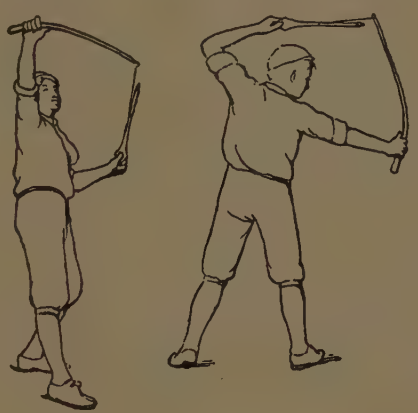
SOME MODERN GERMAN TOYS OF ADMIRABLE DESIGN AND COLOR



TOY-MAKING

SOMEWHERE in your house there must be a corner where you may have a little workshop of your own. With some packing boxes of different sizes, such as you can buy at a grocery or dry-goods store, you can make a bench, a stool, and a shelf or two, like those shown in this sketch, and so make a beginning. For tools you will need a saw, a hammer, a try-square, a good jackknife, a plane, a ruler, and compasses. A pair of stout scissors will do for cutting paper, cardboard, leather, tin, and so on; and a pair of cutting pliers will be useful for cutting wire. Perhaps you cannot get all these tools at once. Never mind; begin with a jackknife, a saw, and a hammer, and add other tools as fast as you can pick them up. As soon as your family know of your enterprise, they will be likely to remember it in making Christmas and birthday presents. Begin, anyhow. Your shop will grow, and your love of it will grow. There is no satisfaction quite like that which comes from making things with your own hands.





A DART is a good thing to begin with. Find a piece of straight-grained shingle two inches wide, and cut it as shown in Fig. 1. After you have sharpened the head end, balance the dart on the edge of your knife-blade and at the balancing point cut the notch. For a whip handle you will need a springy stick such as you can easily cut from a roadside thicket. Cut it two and a half feet long, and a little less than an inch through at the butt end. A stout string or thong a foot long knotted at one end and tied to the stick at the other will complete the whip-bow. Holding bow and dart as in the picture, sling the dart with a motion such as you would make if you were to whip a fiend and had but one chance.

In the making of even this simple dart you will have learned two things at least. One is that it pays to save and store away in your work-

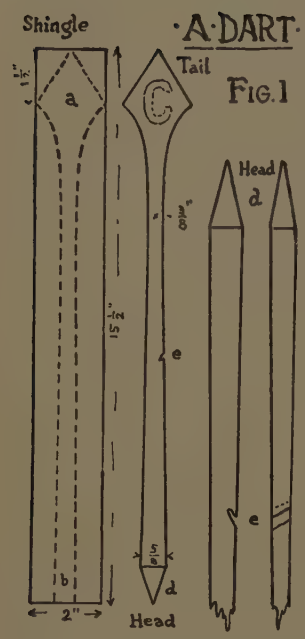
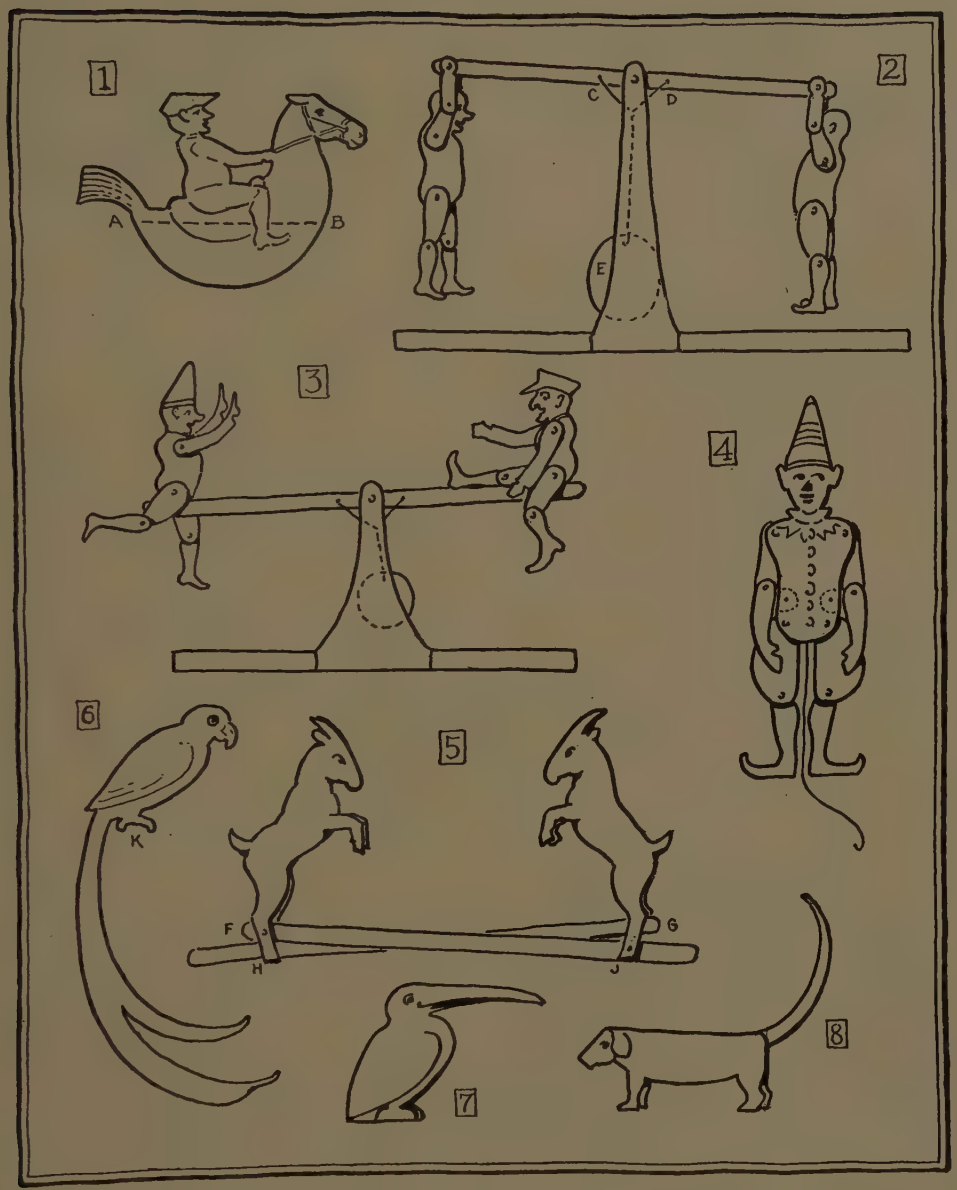


FIG. 1

shop odd pieces of wood, string, rawhide, shoe-leather and such like. Part of the fun of a workshop is the chance it gives you to gather materials that will come in handy at one time or another. The other — a very different sort of thing — is that wood splits along the grain. Of course you knew that to start with; but no matter how skillful and experienced a woodworker you may become, you will always have to take account of the grain of your wood, whether whittling, or planing, or carving, or sandpapering. Working with the grain is like smoothing a cat's fur the right way, — all is serene and as it should be; working against the grain, — well, you know how the cat likes it!

While in the weapon business, you might make a SWORD, an old-fashioned sword, such as knights used, or such as Columbus raised in the air when he declared America discovered in the name of his king. If you were to get the required wood from a carpenter, you would make out a list of the pieces required, a list such as he would call a "mill-bill." The mill-bill in this case would be: 1 piece of soft pine 32″ × 1½″ × 1½″; 1 piece pine 6″ × 1½″ × ½″. (32″ means 32 inches; 32′, with a single after-stroke instead of a double one, would mean 32 feet. The cross stands for "by.") Three dimensions are about enough, as you will see on thinking it over. Two dimensions would be too few, and four would be possible only in fairyland. There is one of the curious facts of the curious world we are parts of, — that length, width, and thickness are all the dimensions imaginable. To come back to the mill-bill: in the case of the sword you probably will not need to apply to a carpenter; but it is well to know how to describe lumber when you do want to order it.

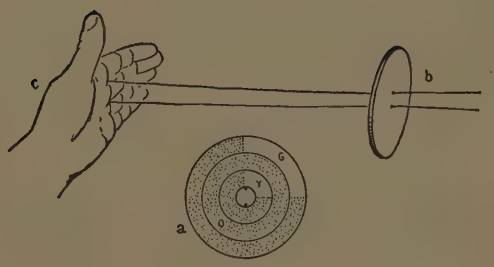
To make the sword, first shape the blade. This will be a good exercise in following a diagram. Do your marking on the smoother side of the blade-piece. Run a pencil line straight down the middle of the whole blade, using a yardstick or straight-edge of some sort, and making sure that the two end-points that you join are exactly centered. This will help you to locate the centers of the two circles that are to be drawn with the compasses at the end and hilt-joint. At the point end make two dots, one each side of the center line and ⅜″ from it, and draw straight lines from these points to the edge of the blade at the hilt-joint. You are then ready to whittle and plane until your blade tapers as a sword blade should. You could leave the blade flat, but that would be only half doing the job. Notice that at A–B there is given a cross-section, or cross-cutting, — a view such as you would get if the blade were cut through at that point and the cut end held towards you. To plane these slanting surfaces evenly will not be easy; in fact, it will take all of your skill. One way to get the cross-piece known as the guard on is to nail it; but that is a poor way. A better is to make a "half-lap" joint, in which some is taken out of one part and some out of another until they will fit snugly together as if sawn out of a single plank. To do this lay the blade on the guard at the proper point and mark on the guard along the sides of the blade. Make a saw cut just inside of these lines, sawing halfway through the thickness, — precisely halfway of both parts. Tack



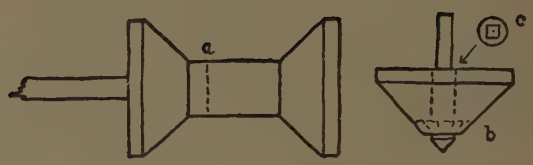
the two parts together securely by means of four tacks, two driven through from one side and two from the other and clinched.

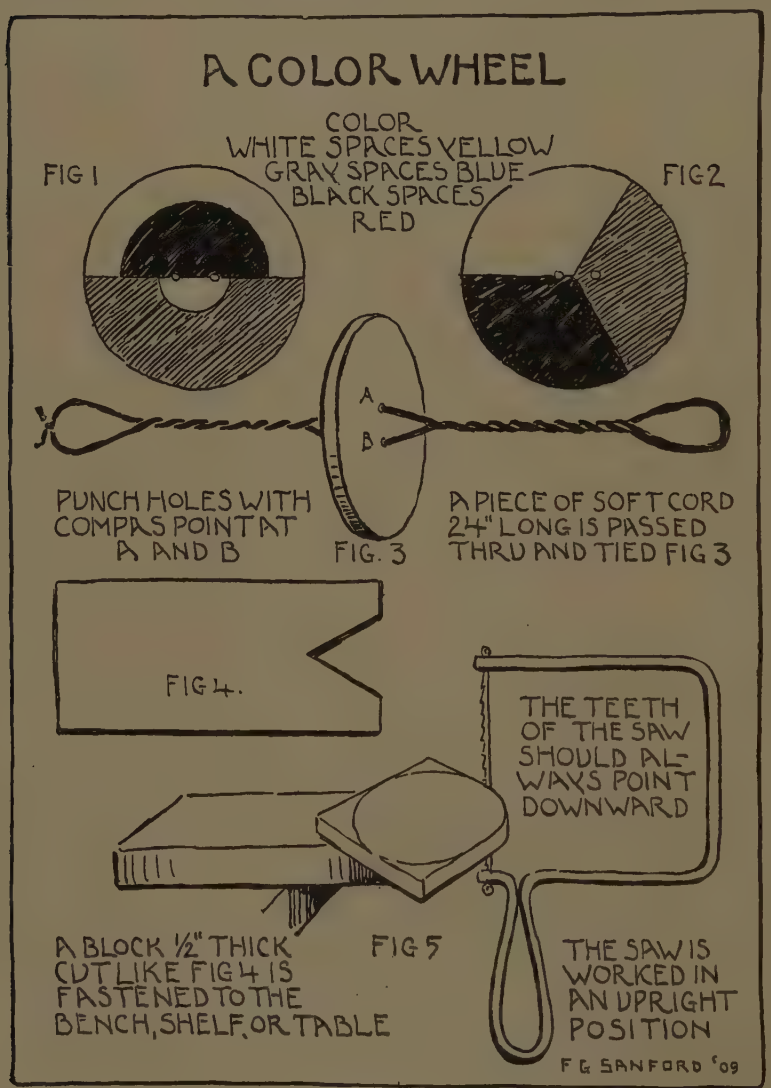
But the making of "things that work" is even better fun than the making of things that can be worked. This plate shows amusing toys made by German school children.

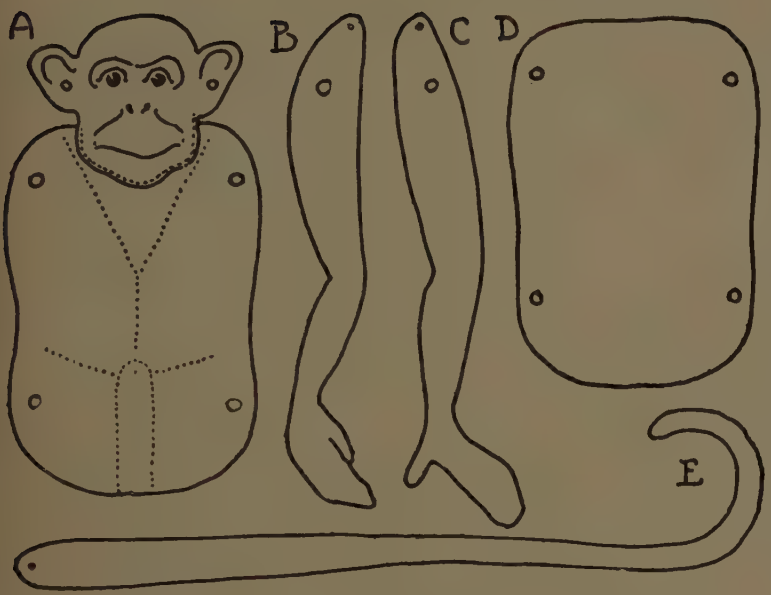
1. A HOBBY-HORSE may be made from three pieces of thin wood, or one piece of thin wood and two pieces of cardboard. The central piece is cut off at A–B. 2 and 3 are two forms of a SEE-SAW. The construction is evident. The weight may be made from sheet lead. 4 is a JUMPING-JACK similar to that described below. 5. TWO PLAYFUL KIDS should be made of thick wood. When the legs are pivoted to two flat rods, G–H and F–J as indicated, the heads of the kids will butt. 6, 7, and 8 are GROTESQUES. The parrot will balance on a string.



A COLOR WHEEL like the above can be made of cardboard or of very thin wood. Two and one-half inches is a good diameter; have the string holes just ¼″ from the center, and loop a four-foot length of very flexible cord through them. With the compasses mark off three rings and color them with crayons or water-colors, having two or three different colors in each ring. When the wheel is spun, the colors will mix and form new colors. A more ambitious wheel, like the one in the large illustration, may be cut from ¼″ basswood or soft pine or cigar-box cedar. You can either paste colored segments of paper on the wood, or paste white paper on and color it. The wheel is kept whirling by starting with it as in Fig. 3 and alternately tautening and loosening the strings. A three-inch diameter works well. Color discs like the one below may also be spun on a top. To make the top, select a spool with deep flanges; whittle a stick to fit tightly in the hole. Drive in the stick and saw the spool off ⅛″ inside the flange at *a*. Drive the stick in a quarter inch more and cut the whole

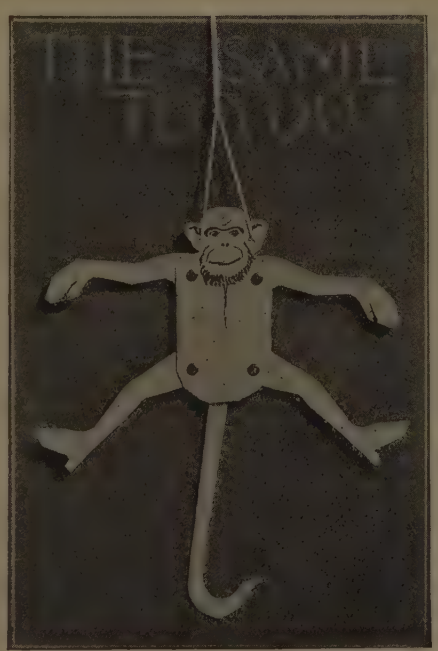


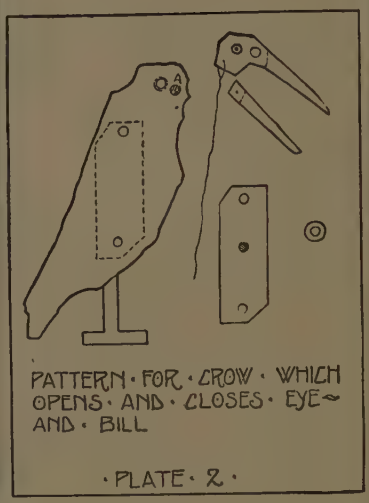

A COLOR WHEEL
COLOR
WHITE SPACES YELLOW
GRAY SPACES BLUE
BLACK SPACES
RED
FIG 1
FIG 2
A
B
PUNCH HOLES WITH COMPAS POINT AT A AND B
FIG. 3
A PIECE OF SOFT CORD 24" LONG IS PASSED THRU AND TIED FIG 3
FIG 4.
THE TEETH OF THE SAW SHOULD ALWAYS POINT DOWNWARD
A BLOCK ½" THICK CUT LIKE FIG 4 IS FASTENED TO THE BENCH, SHELF, OR TABLE
FIG 5
THE SAW IS WORKED IN AN UPRIGHT POSITION
F G SANFORD '09



down as shown at *b*. Cut off the stick above to leave a ¾″ spindle. Square the spindle so that the color disc, when fitted over it, will not slip. Make the disc of cardboard, two inches in diameter. If you follow the diagram and use black and white as the colors, you will get several gradations of gray.

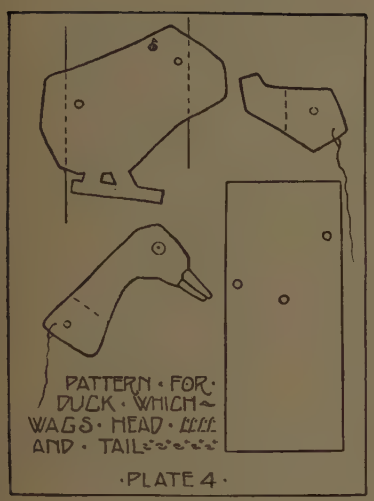
Before we go farther we ought to learn something more about the SCROLL SAW. A saw like that in the diagram may be bought for twenty cents, the blades selling for about ten cents a dozen. It will pay you, however, to get a more expensive saw, for the work is much easier if the crook of the saw is long. In fact, the longer it is, the better. It should reach back far enough to rest against the upper arm, because it is conveniently steadied when resting there. Scroll-saw blades are very delicate, and must be treated with consideration. The best rule is to keep a light grip on the handle, and never on any provocation to force the saw when it does not want to go. Remember that a new blade is very sharp, so that if it refuses to cut, the fault is yours: you have twisted it so that it binds in the groove. Cutting along a straight line is easiest of all. You need only see that the blade moves straight up and down with as little wavering from side to side as possible, and that the wood is moved by the left hand towards the saw, instead of the saw being pushed forward. Cutting large circles is about as easy as straight-line cutting. As an experiment, begin with the simpler parts of the CHEERFUL MONKEY that adorns this page. The plan here given is complete ; but it is hardly large enough for a really respectable jumping-jack. The first thing then is to enlarge the parts either with a pantograph or by the method described on page 338. Doubling the size would be about right. Enlarge the parts on fairly heavy brown paper, cut them out carefully, and paste them on the wood that is to be used, making sure to reverse one of the arms and one of the legs. Be sure about this — the reversing — it will save trouble. If you then simply cut

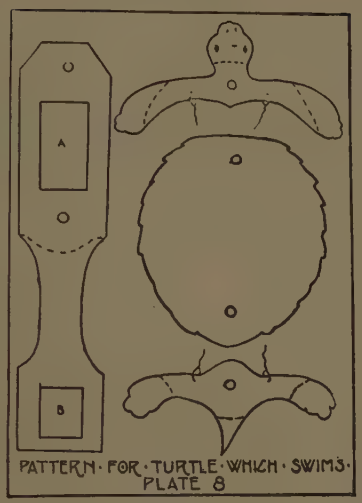


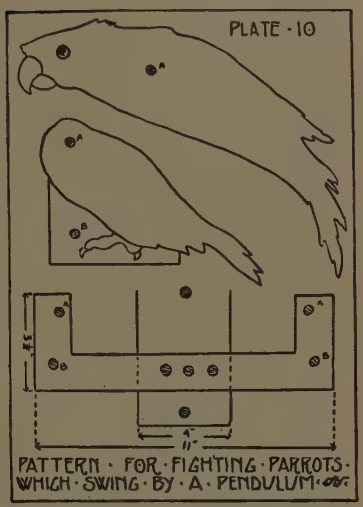


around the patterns, the paper will form an excellent finishing surface for the wood. When you lay the patterns on for pasting, have long parts like the arms run with the grain. They will be very weak and breakable if they run across the fibers of the wood and not with them. Begin by cutting out the back piece. Then try an arm. If you start down the comparatively straight side of the arm you will be safe until you come to the crook of the wrist. At this comparatively sharp curve let the blade do a good deal of moving and the wood very little. That is, keep the saw going as usual, but move the wood slowly. Particularly must this be done as you saw around the finger-tips. When you saw out the front body piece and come to where the head meets the body you will have to move the wood around almost a full turn while the blade stays in one place. To make the turn as sharp as possible, let the back of the blade bear on the wood, rather than the teeth. If at any point in a curve your saw sticks, it is either because you have turned too fast or because you have failed to keep the blade vertical. When the parts are all cut out, bore holes in them, as shown in the diagram, with a bradawl. Then fasten heavy black thread to the inside ends of the limbs and tail, tying and arranging them so that when the toy is completed, and the limbs are hanging down, the threads will lie as do the dotted lines in page 5. Small brass-headed nails should be run through the holes and bent to bind the parts together, — not too tightly, though. The last touch is to take pen and ink or brush and paints and create the most monkey-like grin you can for the big-eared little fellow.

The WINKING CROW and the WAGGING DUCK in the pictures above are to be cut out of wood much as the monkey was. The crow should be enlarged to the length of a good eleven inches. In this case it is preferable to make the pattern on stiff paper and trace it on the wood. Cigar-box wood will answer, but basswood $\frac{3}{16}''$ thick is stronger and better. As before, lay out long parts with the grain. It would be well before cutting the parts out, to bore the holes called for by the small circles in the diagram, all except the holes in the support, the oblong piece with two corners cut off. It is better to mark these through the holes already bored in the body, so that they will exactly correspond. Note that there is but one hole in the head piece, one of the circles being an eye. The holes should be bored with an auger and a $\frac{1}{4}''$ Forstner bit. When the holes are bored and the parts cut out, fasten the lower bill to the body. To do this, lay the body on the table with the bill in place beneath it. With the awl bore through both parts, and in the hole insert a big pin such as you can buy

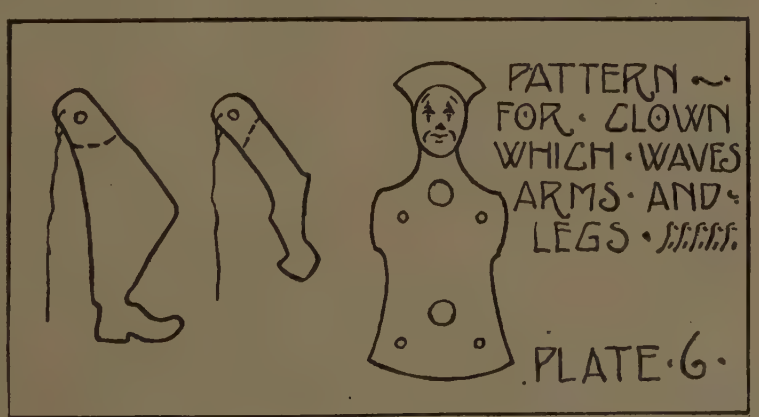






under the name of No. 2 bank pin, — just an unusually large common pin. Cut off the pin with a file or with cutting pliers so that only ¼″ projects. With a pair of "long nose" pliers, bend the projecting end into a U-shaped hook, with the end pointing back into the wood. Then place the body over an anvil or some solid piece of metal as a support for the pin head, and hammer the hook down into the wood. The lower bill is to be fastened tight; so before hammering the hook home, see that the bill is at the right angle with the body. Enlarge the hole in the head piece (the upper bill) with a ¼″ round file. Through the end of this piece punch a hole with the awl and fasten a length of black thread through it. Take a stick of ¼″ dowel or round wooden rod (sold in three-foot lengths) and cut off ½″ of it. Insert it at A, after touching the hole with glue. The bill is then slipped over the rod; if the action is not absolutely free, the hole should be filed larger. Drill a ¼″ hole in the center of a ½″ circle of wood and saw the circle out. This circular piece is touched with glue, and slipped over the dowel rod, allowing space enough for free action of the bill. Two strips of dowel, one inch long, glued as before, fasten the body to the support. As a final touch paint the body black and the legs, bill, and eye yellow.

From head to tail the DUCK should measure ten inches. The method of enlarging the pattern and sawing out the parts is like that used for the crow. Make two body patterns, as there are to be two body pieces. When the parts are sawed out, and sandpapered if the saw has left rough edges, threads are attached to holes bored in the parts that are to wag. Then the three holes are bored in the body pieces with the ¼″ bit. With the head and the tail placed in position beneath the body, insert the bit in the holes already bored in the body. Similarly bore the holes in the support. A bit of dowel ¾″ long is touched



with glue near the ends and inserted through the two body sections at A. This keeps the head from swinging back too far. The holes in the head and tail pieces are filed larger, and sections of dowel 1½″ long are touched with glue and inserted through the front body piece, the moving parts, the rear body piece, and the support. There should be just enough room between the two body sections to allow free action of the head and tail. Drab is the best color for the body, and yellow for legs, eye, and bill.

After the monkey and the duck come a TURTLE and a CLOWN and a pair of PARROTS. What an act they and the clown could do!

Make the back of the TURTLE about four inches long. Instead of being mounted on a support, he is mounted on a handle. This handle is 9″ × 2″. Little need be said about putting the parts together. Two dowel rods ¾″ long pass through the shell and legs to the handle. The holes drilled in the legs are of course to be enlarged with the round file. The threads which operate the legs are passed down through opening A in the handle and then joined, that from the hind leg on one side being tied to that from the fore leg on the other. They are then passed up through hole B. The turtle may be colored brown or green, with red or green markings.

The making of the holes in the handle, by the way, opens up a new problem in scroll-saw work. To make these holes, bore an awl-hole through the wood within the outlines of one of the openings. Then release one end of the blade from its place in the handle of the saw, pass the blade through the awl-hole, and fasten it to the handle again. You can then cut away until the center has been cut out, when the blade must be unfastened again.

The CLOWN is eight inches tall and is made in seven parts. There are two body sections, between which the legs and arms are hung. The clown is fastened to the support by means of two lengths of dowel rod, extending from the rear body section to the support. The arms and legs in this case are fastened to the body with No. 1 bank pins, which are inserted and bent as in the case of the crow. Therefore the holes for the pins should be made with the awl and not with the bit. In

cutting off and bending the pins, allow a little extra length. Then when the time comes to hammer the bent part into the wood, insert on either side of the pin, and between the body parts, two ¼″ strips of wood, so that when the pins are driven in tight, these strips may be worked out, leaving the arms and legs free to move. Fasten the rear body part to the support with one-inch dowels, inserted in the holes already bored according to the diagram. There is unlimited opportunity for brilliant coloring on this supple and lively fellow.

PLATE 11

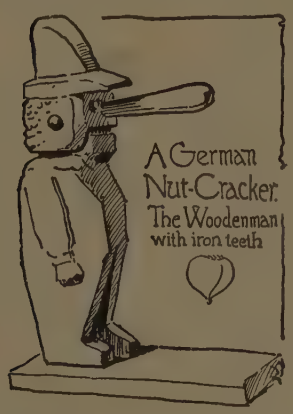
For the two FIGHTING PARROTS you will need to make patterns for and cut out two bodies, two wing sections, a perch, and a support. You will see, of course, that you can cut out two exactly similar patterns and then turn one of them over. The parrots measure 10″ from tip to tip. Quarter-inch holes are bored at the places designated in Plate 10. A in the parrot bodies is filed larger and swung on 1¼″ sections of dowel rod. Holes are bored into two circular pieces of wood, which are slipped over the dowel rod and glued in place just back of the parrots' bodies. Dowel rods, 1¼″ in length, attach the wing sections to the perch at B. The perch is attached to the support by three 1½″ sections of dowel rod. No. 2 bank pins are cut and bent into hooks which are driven into the parrots' throats just back of the beaks. Two linen threads about 24″ long are tied to the hooks and a small lead weight or sinker is tied to the other ends. The threads are tied together about 7″ from the weight, but a little experimenting will enable you to determine for yourself the best placing for the knot. Look into the next bird-fancier's window you pass, and use a parrot there as model for the bright blues, greens, and reds that will give your fighters a lifelike appearance. Stain the perch and support brown.

As a real flight of ambition, try the MERRY-GO-ROUND that is shown on this page. The platform of the affair is made of two circular pieces of $\frac{3}{16}$″ basswood 11″ in diameter. The roof is a similar piece, but of a diameter an inch greater. These are put together on a single dowel rod center pole 14″ long. The animals may be any animals you choose. They might be all cats, the lion, tiger, leopard, etc. Cut them out about three inches high, and fasten them with bent pins to three-inch dowel rods,

so that their feet are about an inch from the floor. These rods are fitted into holes drilled 1½″ from the outside edge of the floor. A large common spool is glued solidly to the bottom of the floor; and the base and roof are glued to the center pole, the roof to be seven inches from the floor. A fringe of scarlet or other bright-colored calico will add to the effect, as well as a pennant fastened to a pin in the top of the pole; and the animals and other parts may be of the brightest colors you have at hand.

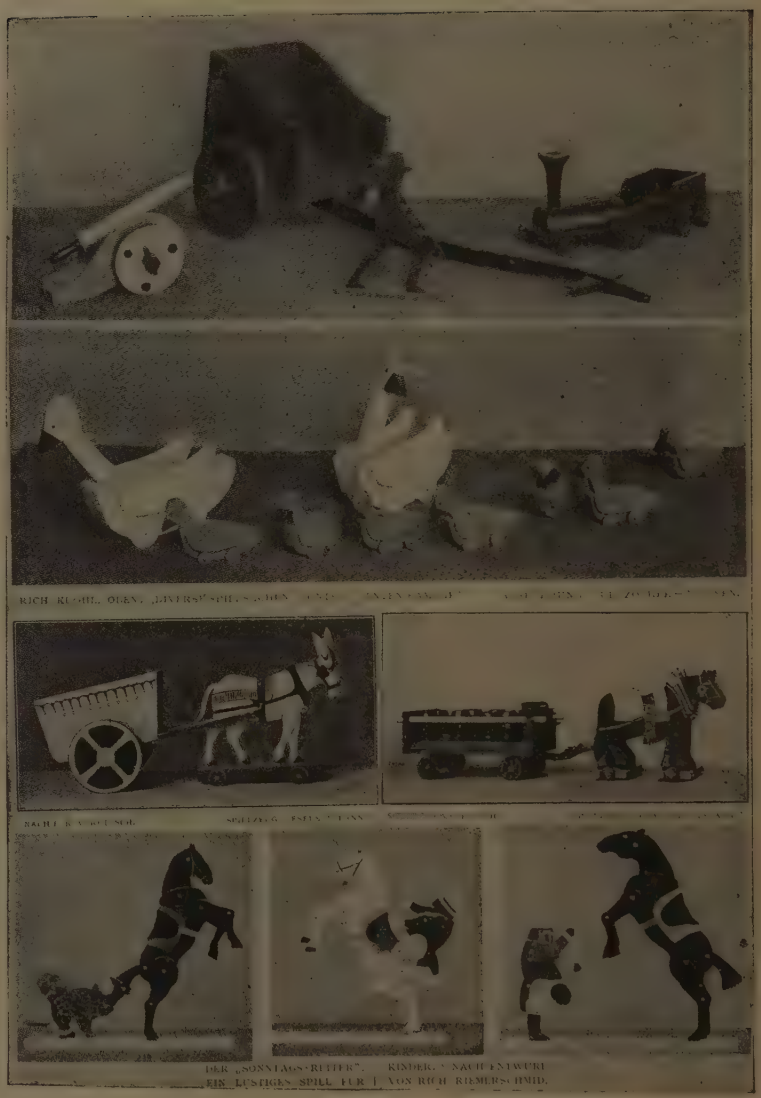
In making all of these toys you have been advised to use certain TOOLS AND SUPPLIES not before specially spoken of. They will all be useful additions to the workshop, and here is a list of them to carry to the hardware store:

Flatnose pliers.
Side-cutting pliers.
Bradawl.
Brace and ¼″ Forstner bit.
Round file ¼″.
Sandpaper, Nos. 2 and 3.

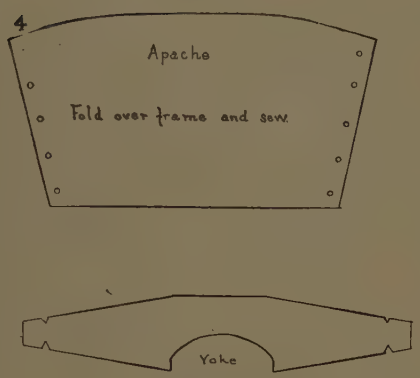


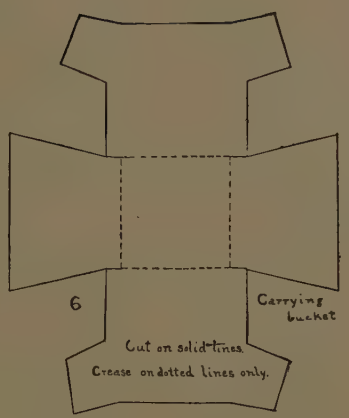
Dowel stick, ¼″, three feet.
Bank pins and basswood.

When you once get well started on scroll-saw toy-making, you will have a wonderful field open before you. You can paste colored illustrations of men and animals on wood and cut them out, or better, you can draw your own patterns. In the picture on this page you will find many suggestions from abroad for saw and jackknife. Make up your mind to give your younger brother or somebody's younger brother a solid home-made toy every Christmas. See if he does n't like it better than boughten things. A justly popular game is to paste colored prints upon thin wood and then scroll-saw them out "every which way," but preferably in curves and not angles. The game consists in trying to put them together again. Of course you could use plain prints instead of colored ones.



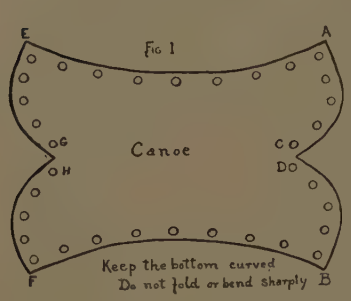
A miniature set of INDIAN FURNISHINGS may be made from the patterns on this page and the next. To make the papoose cradle, take a ten-inch piece of reed (No. 6 reed, the storekeeper would call it), soak it for a few moments in warm water, and tie it in a hoop, shaping the hoop in a long egg-shaped curve like that in the plate. Cut out of chamois (or shoe-top) leather a piece patterned after Fig. 4; sew it over the reed, and lace it with thongs of strip-leather or rawhide. Fig. 6 is a pattern for the carrying bucket seen in the lower left-hand part of the picture, and for the yoke from which two of the buckets are to be suspended by threads. Bucket and yoke are to be made of heavy paper or of wood and leather. The baskets in the picture are made of raffia and what is called "paper twine," materials that can be bought of the stationer (see section

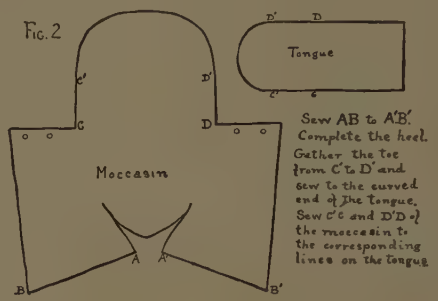




on weaving, page 183). The wigwam should be of birch bark or chamois, supported by four or five twigs tied together near one end and spread out at the other. The snowshoes are of reed, ten-inch lengths, being softened in warm water, bent, and tied with rawhide or shoe-leather strips knotted into a semblance of the filling of a real snowshoe. Or you could use rattan for frames and fine cane for the knotted work or "filling." Best of all is

the canoe. This especially ought to be of birch bark, if that is to be had. Get the bark in the deeper woods, though, and not by the roadside; and don't cut too deep into the tree. When you have enlarged the pattern to a length of six inches or so, cut out the bark and punch out holes all along the edge. Lucky are you if you have a fine pair of eyelet pliers to do the punching with. Otherwise a harness punch will do. Do the sewing with a long strand of brown or red raffia threaded into a large needle. First sew A to B, and continue down the bow to C and D, sewing over and over. Then hold a reënforcing strip of paper twine against the edge of the bow while you continue the over-and-over sewing up again and along the sides and other end. Be careful all the while not to crease the bottom, as that would spoil the natural and proper shape that the canoe will take if the bottom is sound. From the other pattern on this page moccasins may be made. The best material is chamois skin; the method of sewing is sufficiently described in the diagram.





When we come to Mrs. Doll and little Miss Doll seated in their own little chairs and at their own little table, we enter a real fairyland of delight. Models of boats, of engines, of houses, of almost anything, have a strange fascination about them. And if we have made the models ourselves how much more we shall like them.

If we were makers of real full-size FURNITURE, the first thing we should have to do would be to lay in a supply of wood; and the second thing, I suppose, would be to get orders for our wares. Let us be model workmen, and go at our work in the most approved style. We undoubtedly have sundry pieces of basswood left over from the making of previous toys, and these will be very useful. We ought also to have on hand a goodly stock of cigar-box cedar; in fact we should keep our eyes open for all the clear-grained thin wood that comes our way. We should in addition obtain some of the very smallest brads, and either a bottle of ready-to-use glue, or a glue-pot. In case there is a good deal of gluing to be done, the glue-pot is best. Now, you cannot be too careful to have a good glue-pot. It is a sort of small iron double boiler, with an outer

pot for boiling water — to be kept boiling over the fire — and an inner pot in which the glue is kept at just the right heat all the time. The hardware dealer sells dry chips of glue; buy a quarter-pound, half-fill the pot with chips, and pour in water enough to cover them. More water may be added if the glue proves to be very thick when it melts. It is an excellent thing to have a glue-pot in the house. Once every four months you should put the glue-pot on to boil and gather all the chairs and other wooden articles that need to be tightened in the joints. As said before, glue should be allowed to set two days before the articles are put to any strain.

So much for the manufacturer's stock. Now for the orders: The best way to secure a flourishing demand for furniture is to build a house, — in this case a doll's house. The house may be very satisfactorily made of a strong grocer's box that is not too deep. Before setting in the one or two floors, decide where the stairs are to come and cut openings for them. Handsome stairs may be made of a piece of straight narrow board with treads glued upon it. Material for the treads you can get if you will go to a wood-working shop and ask in magic phrase for some "strips chamfered off of planking." The wood-worker will look at you curiously, wondering where you learned the terms of his trade; and then he will point you to the pile of waste, where you can find lengths of wood "triangular in cross-section" (this is geometrical magic). You will see how short pieces of this wood may be glued on the slanting board to make very real stairs. It pays, by the way, to be on neighborly terms with the wood-worker who lives nearest your home,— and for that matter with the painter and the blacksmith too. These men won't mind your *quietly* watching them; and they will be glad to help you with advice and various materials, — if you don't "pester 'em." You know what I mean by that. Perhaps we cannot be too certain that you fully understand this. A man's work is so important that he may have to scold even you.

The house may be topped off with a slant-roofed attic; with partitions; with windows of glass or oiled paper, paper window-bars being pasted across; with leather-hinged doors; with real wall-paper put on with flour paste (or tube paste thinned with water); with bits of carpet; with rag-rugs that your mother will

show you how to make; with coats of white paint and shellac; and so on and so on.

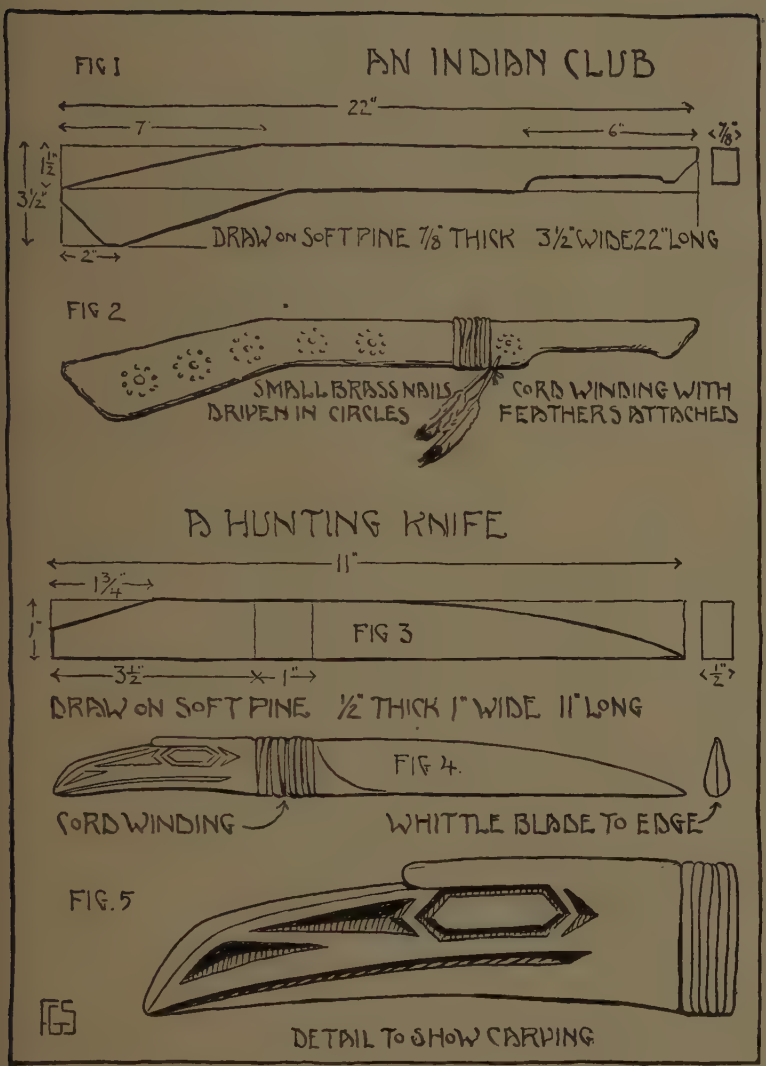
The illustrations on these pages will suggest patterns for several styles of furniture. It is to be desired that each room should have a complete set in some one style. You will notice how attractive the set on this page looks because it is all of one kind. If you should want more ideas for chairs, tables, and the rest, you could write to some of the large furniture manufacturers who advertise and who will send you catalogues full of pictures.

When once you have decided on a particular pattern, draw it out on heavy paper, allowing a piece of pattern for each piece of wood, unless, of course, two parts of the furniture are just alike, as in the case of most chair sides and table ends. In making the pattern for a table end like that in the picture above, you will find it handy to fold the paper, draw a pattern as if for one-half of the end, cut the double sheet, and then lay it out flat. By drawing the pattern in such a way as to bring the fold in the center of the completed object, you will get both sides of it just alike.

When the various pieces have been cut out, and the carvings or decorations added, they should be sandpapered wherever necessary. Decorations like those above may be cut with the scroll saw or with a round-edged chisel called a gouge. The convenient thing about small furniture is the fact that its parts need not be jointed one into another, it being enough simply to use glue, making what a carpenter would call a butt joint, — that is, a joint in which the butt of one piece simply rests flat against the piece it is nailed or glued to. Before setting about the gluing, mark with a pencil where the various parts are to go, marking on the sides of a chair, for example, where the seat is to rest. Then, when you apply the glue and put the parts together, there will be no awkward mistake.

Some kinds of wood will look very presentable if simply given a coat of brown or green or red water-color. If you do not like the "dull finish" that results from water-colors, add a coat of shellac. Shellac is almost colorless, and just adds a water-proof coating to the color beneath. Varnish might be used, but it is far less convenient than shellac. You will not want to use ordinary paint, as shellac and stains and water-colors are thinner and better suited to such small objects. You might use the tube oil-colors, but they are costly.

While you are at work on furniture, using the scroll saw on thin wood, don't forget that you have the very means of making fascinating *picture puzzles*. Take a map, or a cheap Japanese print, or a cartoon from a weekly, and paste it firmly upon a sheet of wood. With a pencil, mark out the surface in small irregular shapes averaging about as large as a half-dollar, following the outlines of the picture as little as possible. Then run the scroll saw along these lines, and your puzzle is completed. Use mucilage for sticking the paper to the wood; and if possible run a rubber roller (squeegee) over and over the surface, so that the paper will never come off. If



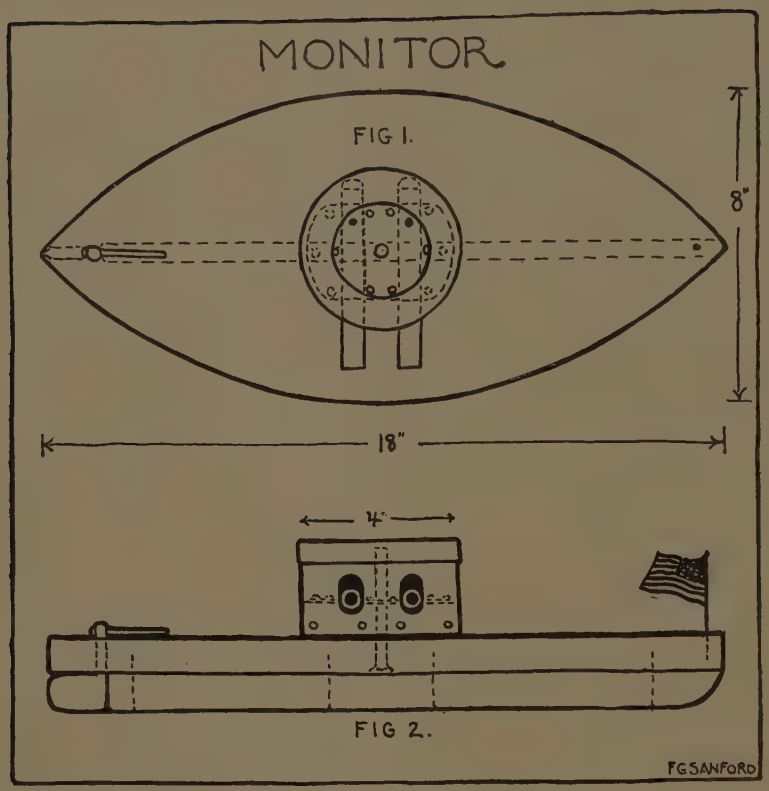
"play Injun." To do this in the regulation way, you ought to have a well-made CLUB and HUNTING KNIFE. Figure 1 gives the necessary dimensions for the club. After marking the necessary lines on the pine board, saw out the form roughly, and then whittle the handle, and round all the edges, finally using sandpaper. Get a few cents' worth of the smallest brass escutcheon pins and some of a larger size. Mark circles on the blade and drive in the pins. Now stain or oil the whole club. Oiling is the easier. Use linseed oil, allowing it to dry for a day or so. This will give the wood a rich color and make it waterproof. Dip the tips of some feathers in red ink; notch them slightly near the other end, and tie them on with the ends of a cord that has been wound tightly around the handle.

The HUNTING KNIFE may be made of soft pine or of oak, hickory, or ash. The handle, you will notice, is a hawk's head. This can be carved with a jackknife just as one carves one's initials. Hold the knife like a pencil, and cut a little at a time, deepening the grooves gradually. Color the eye and nostril red; then stain or oil, and bind. This bit of carving opens the door to some delightful research among the carved and inlaid weapons of the savage peoples. At the library look up the war clubs of the Pacific Islanders.

To carve wood or to cut leather you will need to have a sharp knife. By all means add to your workshop equipment an oilstone. You cannot work comfortably without one.

you want to make an original kind of puzzle that is a great puzzler, and that none of your friends have seen, here is the latest wrinkle. Paste four or five small pictures on a square of wood, instead of just one. Have one or two upside down, and let them overlap somewhat. The effect of this is bewildering, and will keep your friends and you busy on a rainy afternoon.

When September comes, and the falling leaves are gathered in heaps and burned with the fragrant smoke that is the finest perfume and incense in the world, then is the time to



Here are the plans for a MONITOR with a real revolving turret and guns that will stand firing with real powder and will hurl shot or pebbles a considerable distance without blowing the guns and turret to pieces, if you use common sense and a small charge of powder.

To get a perfectly symmetrical pattern, fold a piece of wrapping paper in four and mark and cut a curve as nearly like that of a half side of the deck plan in Fig. 1 as you can. The hull should be of $\frac{7}{8}$ inch soft pine. Mark the pattern on it; saw away as much as possible of the corners, and give the hull its final shape with a plane or a spoke-shave. File off a round spike to $3\frac{1}{2}$ inches in length. Bore a hole in the exact center of the hull, of the right size to hold the spike tightly. Enlarge the hole at the underwater end so that the head of the spike can be set well into the wood. Make the keel $16\frac{1}{2}$ inches long, 1 inch deep, and $\frac{1}{4}$ inch or $\frac{3}{8}$ inch thick. Nail it on with four $1\frac{1}{2}$ inch brads or finishing nails. Then make the rudder, rounding the post carefully. Bore the rudder hole through the hull somewhat larger than needed, since the wood will swell in the water. Bore the tiller hole and set rudder and tiller in position.

The turret is to be made of a tin can of the given dimensions. A can that is too long may be shortened by means of tin-shears. Out of the top of the can cut a large hole $2\frac{1}{2}$ inches across. To get the shears at work, punch a hole in the middle of the circle and then work the shears out to the edge. The gun carriage should be $\frac{7}{8}$ or 1 inch thick, and just large enough to fit within the tin. Fasten it within the tin, after you have cut in it the two grooves called for in the diagram, and fastened the guns down by tacking over them the tin shown in the diagram, lower right-hand corner. Previous to this you should have cut the port-holes, the plan showing you where they should come. Naturally the thickness of the gun carriage determines the height of the top of the port-holes.

In the original monitors, each port-hole was closed after the guns were fired and run back by the swinging-to of a heavy metal shutter.

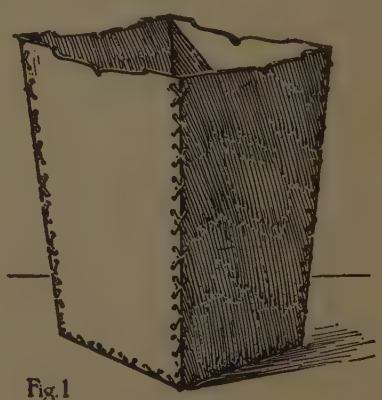
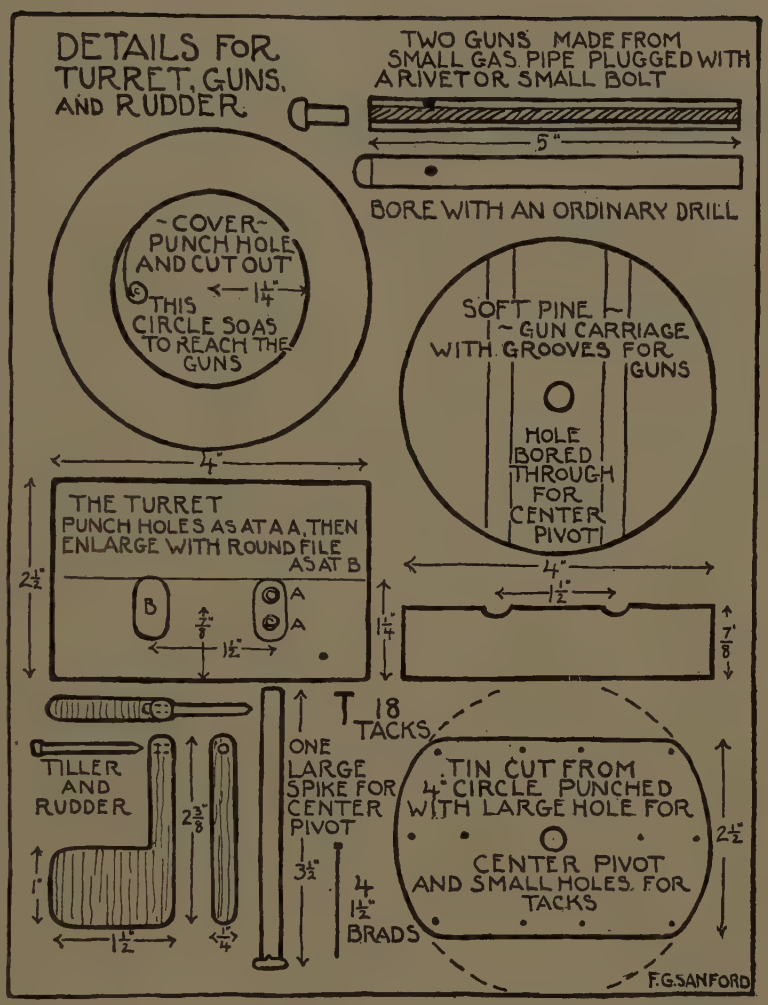


Fig. 1

After the port-holes have been made by punching through the tin with an awl and enlarging the holes with a round file, the matter of the guns is to be attended to. The guns are of gas-pipe, about $\frac{3}{8}$ inch in diameter, with thick sides and a small opening. Each gun is five inches long. The pipe may be cut with a triangular file or with a back saw. Plug one end with a large rivet, a bolt, or a spike filed off and driven in hard. The plug must be a tight fit or else it will blow out, or allow some of the force of the explosion to leak out at the breech. Bore the fuse hole with a twist drill, keeping plenty of oil on the iron.

The tin that fastens the guns to the carriage will cover the fuse holes, and must be punched through immediately above these holes. When the wooden carriage has been fastened to the tin turret and the turret has been set down upon the spike pivot, it is time to fire the guns. To load them, take off the turret, place a fire-cracker fuse in the fuse hole, and then pour in a half-inch of gunpowder, measured by the ramrod that you have made especially for the purpose. Ram in some tissue paper wadding, — not very much; and then put in shot or small pebbles. Light the fuses and push the Monitor off from shore, making your push a gentle one, so that she will not turn about and fire her charge in the owner's direction. It need hardly be said that a coat of drab or black paint is needed to make the vessel both waterproof and of regulation appearance. The powder charge may be increased slightly, if the half-inch charge proves too light.

Read about the famous Monitor of 1862.

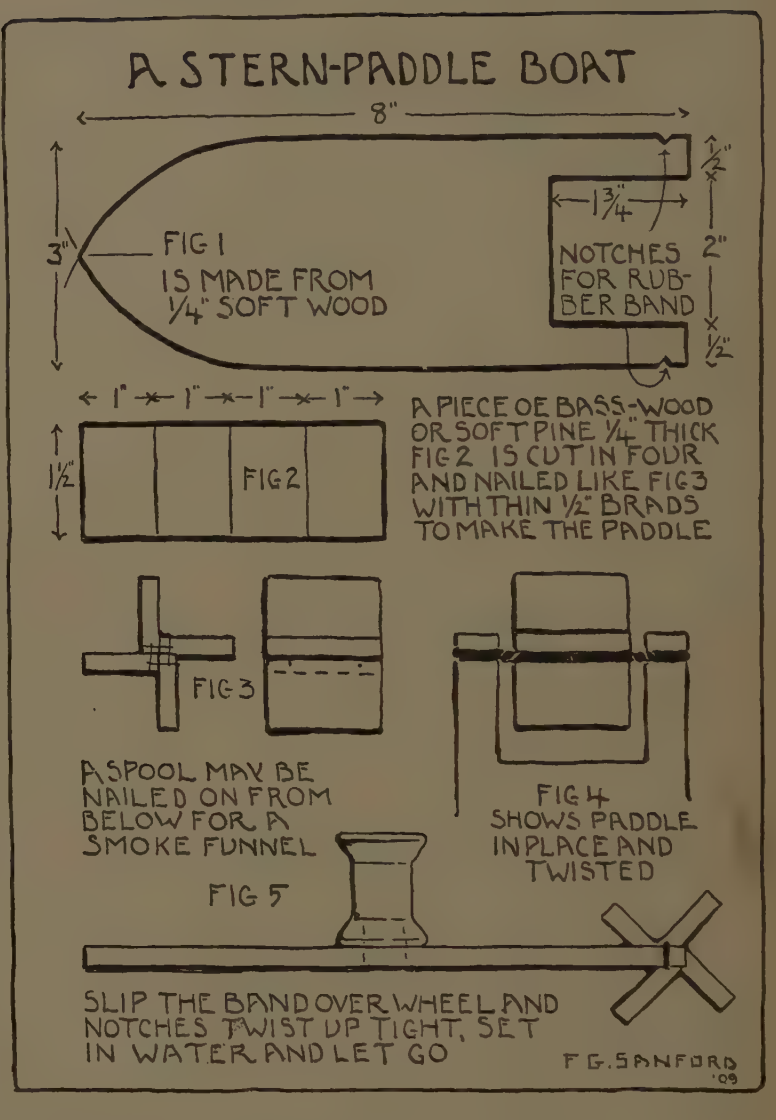


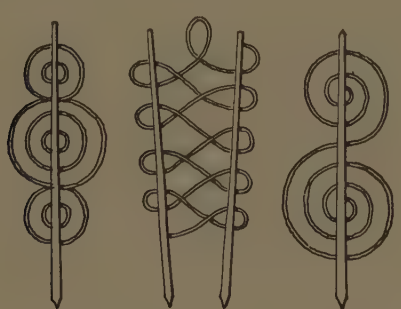
The WASTE BASKET shown on page 16 is made of heavy cardboard, the kind called binder's board being the right sort. When you have made a pattern for the sides and cut out four of them, and the bottom as well, you should paste over them some attractive cartridge paper or mild, very simple wall-paper, covering both the outside and the inside, to prevent warping. If you are intending the basket for a particular room, try to use a color that will make the basket suit its surroundings. Dry the pieces beneath a weight of books; then punch holes along the edges at measured points and lace, using a belt punch if you have one. Leatherboard is even stronger than cardboard.

The plan given on this page is for a PADDLE-WHEELER of the stern-wheel type. You know that on shallow rivers and on rivers in which there are sand bars to go over, like the Mississippi and the Ohio, stern-wheelers are much in use. They go pretty well in bath-tubs, too. By consulting the plan you will see that the hull should be fashioned from a ¼ inch slab of soft wood, the outline being patterned on a piece of 3 by 8 inch paper folded lengthwise to make both bow curves just alike, marked on the wood and cut out with the scroll saw.

Remember in cutting out the square inside corners of the paddle opening not to force the saw but to keep it working up and down while you turn the wood slowly. And then when you come to the second inside corner you will have to back out and make the last cut from the outside, unless you have a scroll saw large enough to allow the length of the boat to pass between its shanks.

The construction of the rest of the boat is made clear in the diagram. A tack-hammer will be found useful in nailing the parts of the paddle-wheel together. If one of these parts splits, keep patient and try another.





You can add realism to the short voyage by sticking a small Christmas candle into the hole of the spool and lighting it.

To make pretty TRELLISES like these for small plants to climb upon, make tapering stakes of cedar, bore holes in them at regular intervals, and run flexible rattan through, fastening the ends with wooden wedges or with brads. To make them harmonize with the plant-foliage, paint them leaf green.

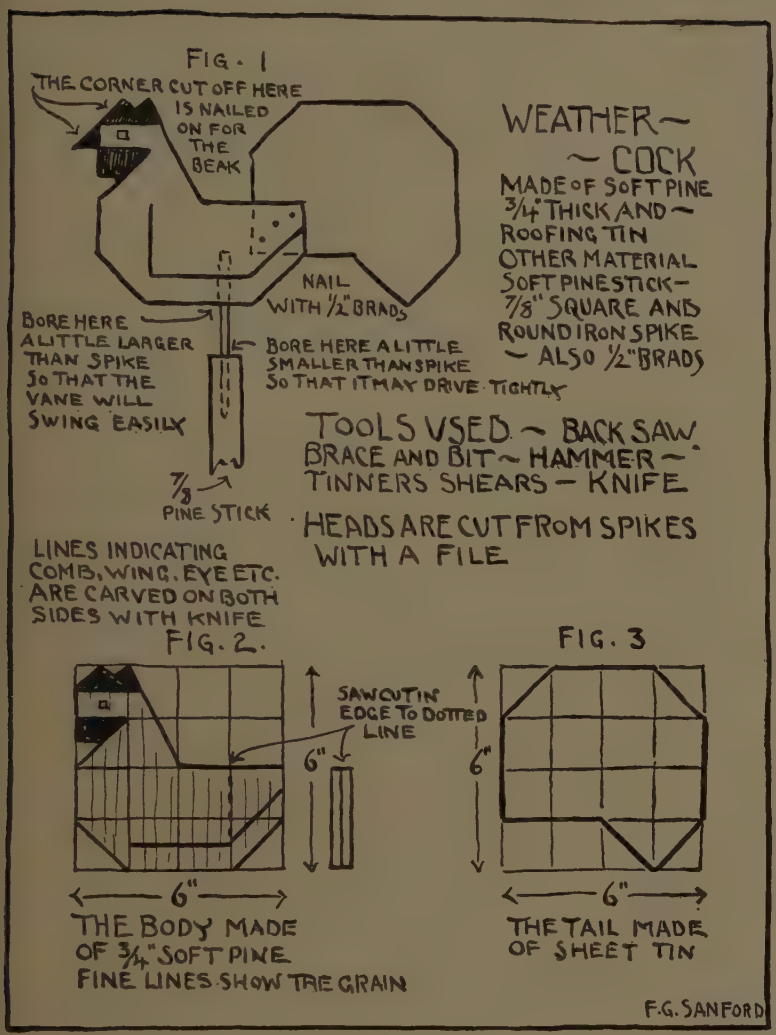


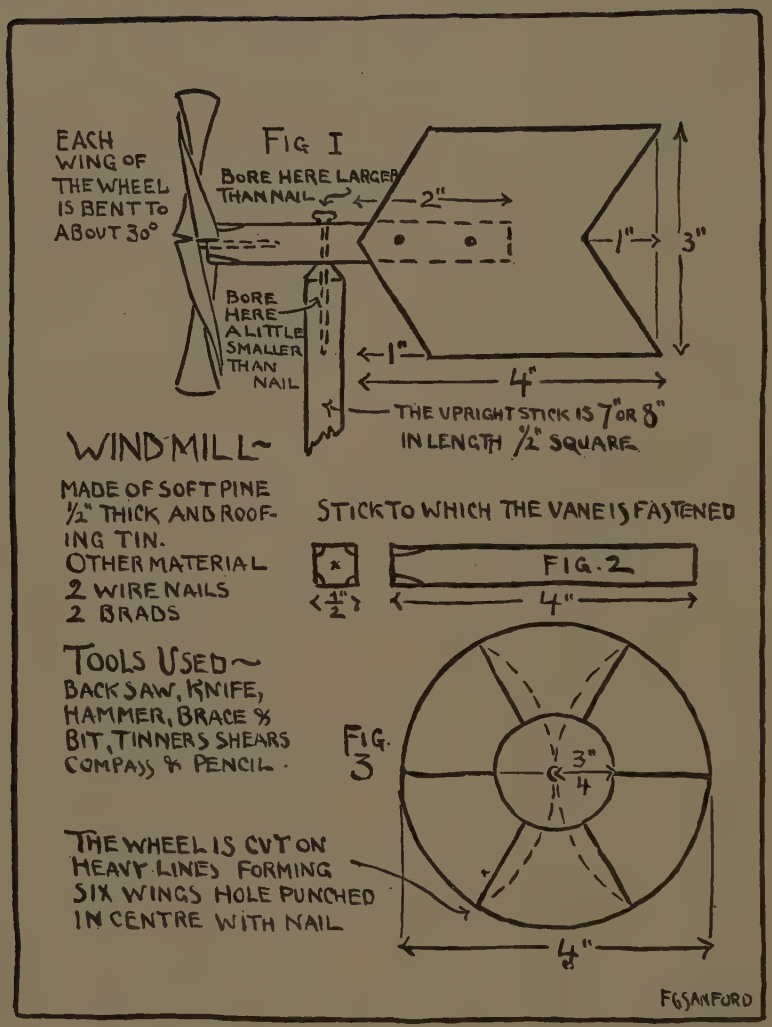
FIG. 1
THE CORNER CUT OFF HERE IS NAILED ON FOR THE BEAK
NAIL WITH ½" BRADS
BORE HERE A LITTLE LARGER THAN SPIKE SO THAT THE VANE WILL SWING EASILY
BORE HERE A LITTLE SMALLER THAN SPIKE SO THAT IT MAY DRIVE TIGHTLY
⅞ PINE STICK
WEATHER-COCK
MADE OF SOFT PINE ¾" THICK AND ROOFING TIN
OTHER MATERIAL SOFT PINE STICK-⅞" SQUARE AND ROUND IRON SPIKE - ALSO ½" BRADS
TOOLS USED - BACK SAW, BRACE AND BIT - HAMMER - TINNERS SHEARS - KNIFE
HEADS ARE CUT FROM SPIKES WITH A FILE
LINES INDICATING COMB, WING, EYE ETC. ARE CARVED ON BOTH SIDES WITH KNIFE
FIG. 2.
SAW CUT IN EDGE TO DOTTED LINE
6"
6"
6"
THE BODY MADE OF ¾" SOFT PINE. FINE LINES SHOW THE GRAIN
FIG. 3
6"
THE TAIL MADE OF SHEET TIN
F.G. SANFORD

There is scarcely anyone who has not some place and use for a WEATHER VANE. The henhouse, the barn, the corner of the piazza roof, the piazza railing, — surely here is room enough for a whole group of weather vanes, and such a group will now be described, and the plans for them given.

A commanding vane for the henhouse, if not for any other of the locations mentioned, is that shown on this page, — a true weathercock, true to the tradition that has set many a thousand gilded Chanticleers to pointing in all the four quarters on the cupolas of barns. Only this one is to be not wholly of metal, but only partly so. The body is of pine wood, the tail alone being of tin. Both body and tail are cut from six-inch squares; and the patterns here given may be easily enlarged if you will take two six-inch squares of paper, fold them four times, and then unfold them again in order to use the creases as guiding marks in transferring the patterns according to the method of enlarging by squares. Mark not only the outlines but the wing and head lines, and transfer these to the wood by means of carbon paper. Make light grooves along these lines. When the tail has been nailed into the saw-cut in the body, balance the whole vane flatwise over the edge of a saw, to locate the most advantageous place for the swivel hole. Paint the body and tail white and the comb bright red.

If you will let your imagination work over the matter, you will be able to think of a dozen different shapes that might be used as vanes, like those here shown.

Perhaps you are fond of machinery; if so, why not try a locomotive and tender?


EACH WING OF THE WHEEL IS BENT TO ABOUT 30°
FIG I
BORE HERE LARGER THAN NAIL
2"
1"
3"
BORE HERE A LITTLE SMALLER THAN NAIL
1"
4"
THE UPRIGHT STICK IS 7" OR 8" IN LENGTH ½" SQUARE
WINDMILL~
MADE OF SOFT PINE ½" THICK AND ROOFING TIN.
OTHER MATERIAL
2 WIRE NAILS
2 BRADS
STICK TO WHICH THE VANE IS FASTENED
FIG. 2
½"
4"
TOOLS USED~
BACK SAW, KNIFE, HAMMER, BRACE & BIT, TINNERS SHEARS COMPASS & PENCIL.
FIG. 3
3/4"
THE WHEEL IS CUT ON HEAVY LINES FORMING SIX WINGS HOLE PUNCHED IN CENTRE WITH NAIL
4"
FGSANFORD

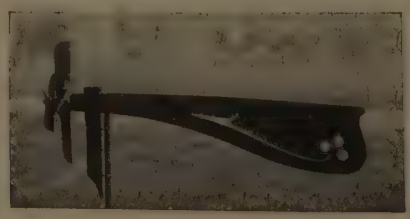
A VANE that is at once a vane and a windmill is here illustrated. The top of a large can will furnish the raw material for the turning part. As it is fairly hard to find the center of a circle without knowledge of geometry or a specially made tool, it would be well to put a dent near the middle of the tin and with the compasses make a circle having the dent as a center. With the compasses set as in making the large circle, put one leg down at any point in the circumference and swing an arc that will touch the edge at two other points. Draw a line through the first point and the center, and from the other end of this swing another arc. You will then have six points equally distant from each other around the circumference. With these located you can continue the marking of the tin in accordance with Fig. 3 in the diagram.

"Each wing," you will see it stated on the diagram, "is bent to about 30°." If you do not know what 30°, or thirty degrees, is, draw a right angle, or square angle, which is ninety degrees, and divide it in thirds. Then you will have an accurate enough notion of the amount of bending required. The bend will be handsomer if gradual than if sharp.

Having sawed a channel in the vane-stick for the "feather" of tin, and having nailed this in place, and nailed on the turning wheel loosely, balance the vane on a knife-edge, and at the balancing point bore for the pivot-nail. Finally apply one or two coats of white or other paint. If the bearing parts have been carefully smoothed off, you will have an accurate and lively index of the wind.

Other patterns for windmill vanes are possible without end or limit.

In the two shown below a simple design in sawed work attracts the eye.



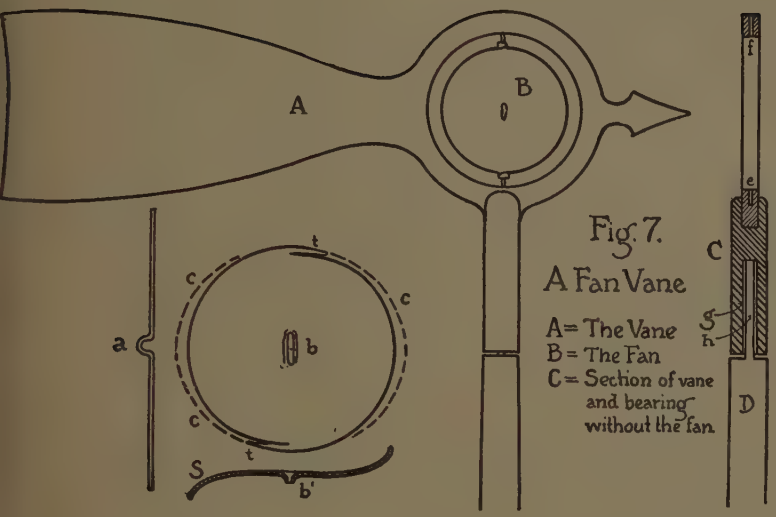


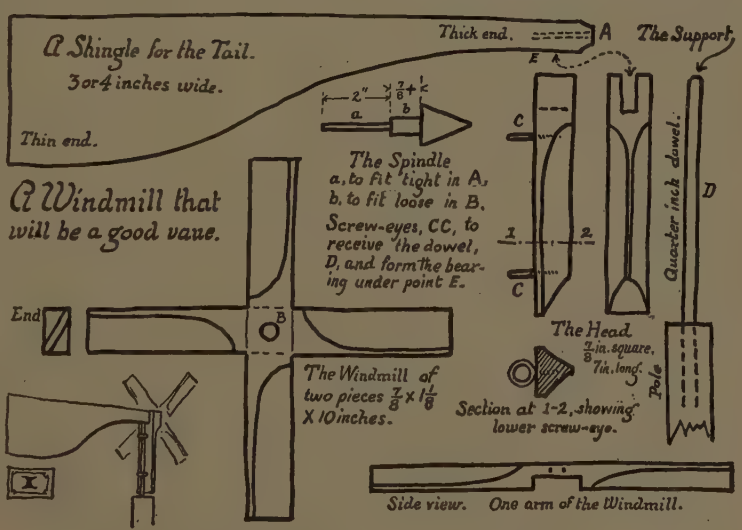
Fig. 7.
A Fan Vane
A = The Vane
B = The Fan
C = Section of vane and bearing without the fan.

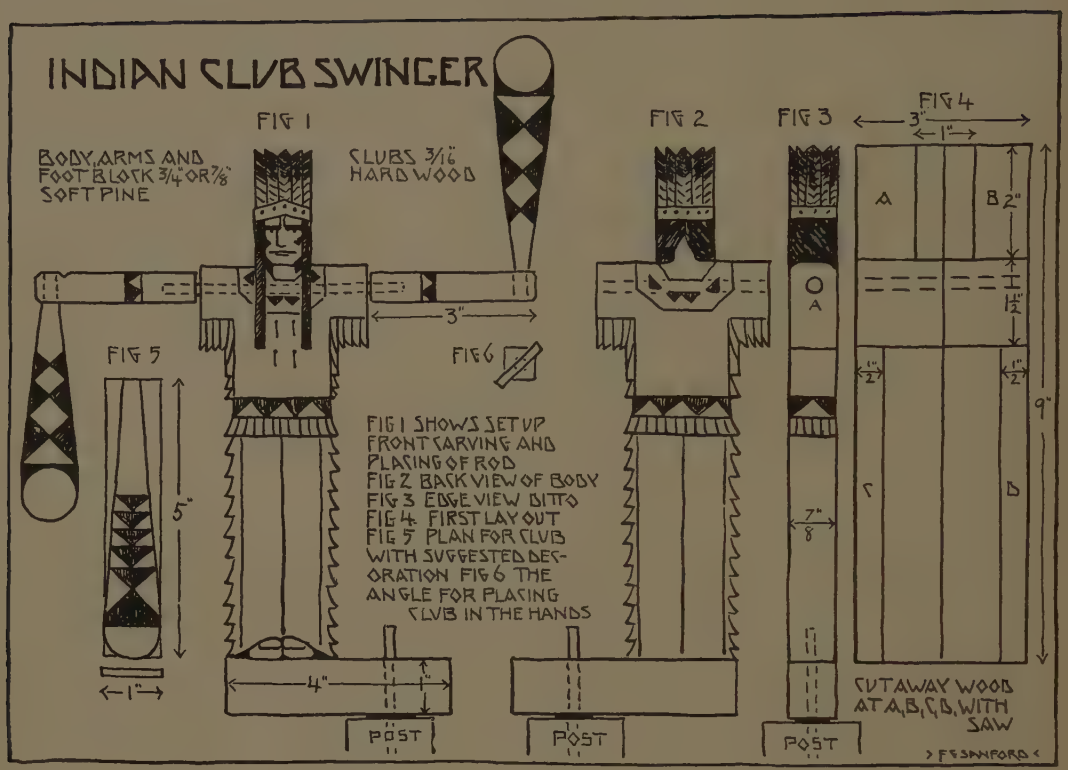
The FAN VANE here drawn is to be made of a clear-grained shingle, a rod, a wire, and a piece of tin, — simple enough materials, surely. Draw on the shingle the lines of the vane, varying the shape of the head and tail if you care to. There are a good many different types of arrow or spear head; and the tail may have openings cut in it in a number of patterns. Cut out the form with the scroll saw, or with the newly whetted jackknife. Bend the wire as shown at *a*.

Cut out the tin that is to become the fan in the form of an ellipsis like that shown by the dotted line, *c*, *c*, *c*, in the illustration. The pattern for this curve may well be made on folded paper, as in the several previous cases in which we have wanted two curved sides of an object to be exactly alike.

With a screw-driver punch in the tin a slot, *b*, large enough to receive the crook in the wire. Also cut the little tails, *t*, *t*, and bend the tin so that when the top edge is looked down upon it will look like a reversed curve, as at S. Then place the wire in position and with a nail-set (another tool to add to your equipment) force the edges of the tin, *b*, b^1, back into their original position, to clamp the tin to the wire within the loop *a*. Wind the tails *t*, *t*, around the wire, one one way and one the other.

Make C according to the drawing, a thing considerably easier to say than to do. Careful work here is essential to the right working of the vane. H is a spike with head filed off and the top filed level and smooth. It is driven into D. G is a hole just a little larger than the spike, bored in C, which latter, by the way, may be successfully made of a section of broom-handle. Into a carefully sawed groove in the top of C the shingle part is wedged tight. Holes for the wire of the fan are then bored at *e* and *f*, the latter, it will be noted, going clear through. Run the top of the fan wire up through *f*; then drop the bottom into socket C. If the vane does not balance well at the pivot, cut off some of the head or tail, before painting the whole. The other model here given is self-explanatory. This model is the pattern for the two at the bottom of page 20. They are built upon the same general plan, but are more elaborately designed. This model is one which the beginner can easily make.





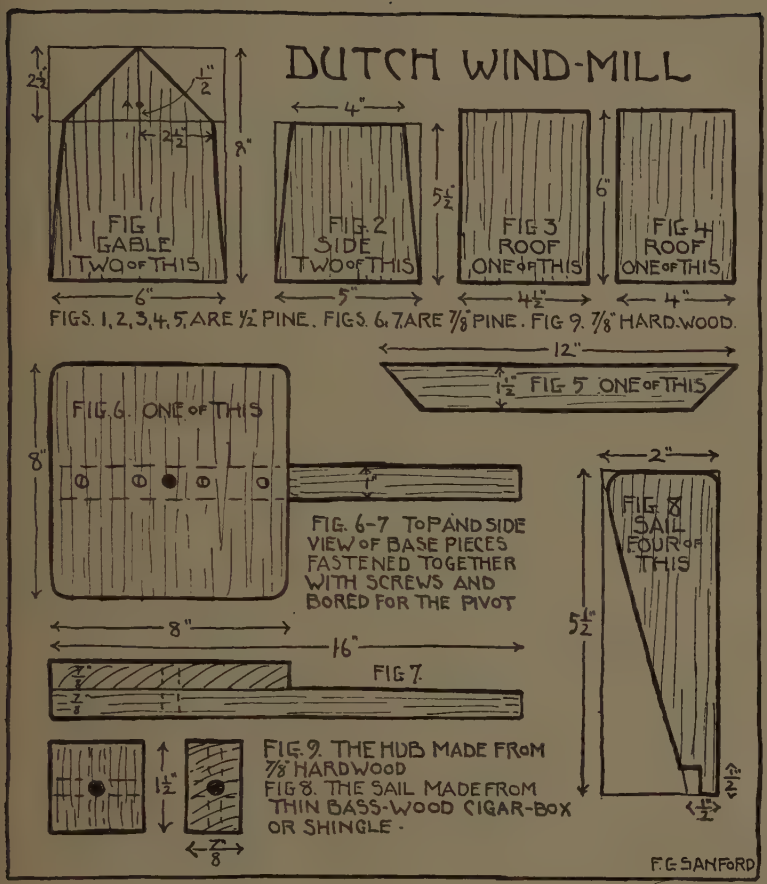
Surely you have seen at one time or another a merry sailor-boy weather vane on the porch of a house or of a summer cottage, swinging clubs or paddles. By studying the following description and the above diagram you can learn how to make a figure that not only swings Indian clubs, but is an INDIAN CLUB SWINGER. Whether he is Apache, Algonquin, Huron, or Sioux depends on what you want him to be.

Start with a block such as you see in Fig. 4 of the plate. Mark the construction lines with a try-square, marking these lines on one side, on the top and edges, and thence on the other side.

Then saw away the superfluous parts A, B, C, and D, and sandpaper the rough edges. Having come so far, study the drawings of the front side and the rear and with a pencil mark them upon the sandpapered block. Then set your jackknife's keenest blade to work at grooving the lines and notching the fringed edges.

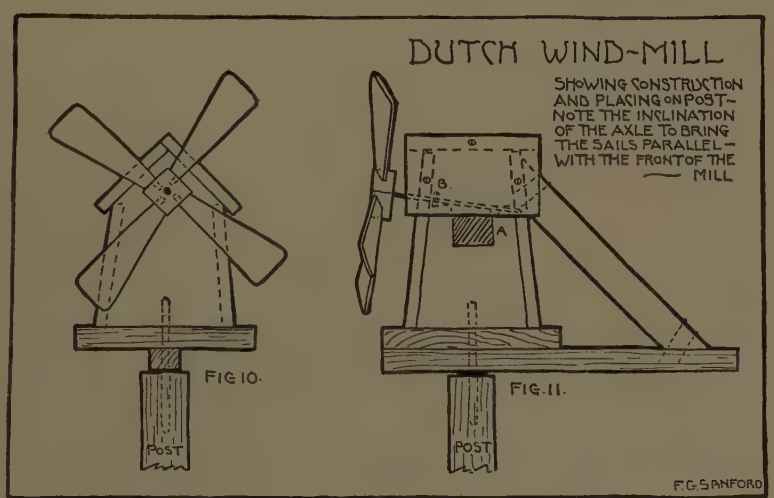
The arms are made of sticks $\frac{3}{4}$ inch square and 3 inches long. A bit of telegraph wire, made absolutely smooth and straight, or a section of heavy wire nail makes the connecting rod that runs through the slightly larger hole bored with great care straight through the body. To get the surest results, bore this hole half through from one side, and then half through from the other. The round file should be used in making the hole perfectly smooth. By the way, it is best to bore this hole before doing the carving, so that a mistake in the boring may not be disastrous.

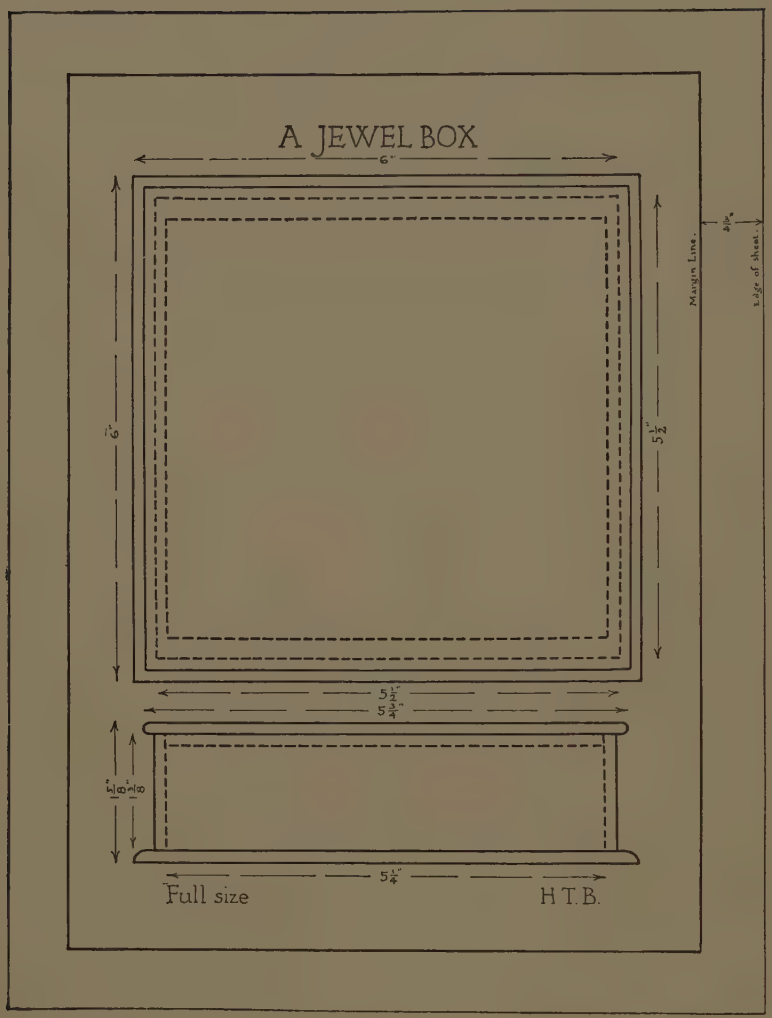
The clubs should be of $\frac{3}{16}$ inch wood if the wood is soft, or thinner if it is hard. Thrust the rounded small end of each club through a hole bored in each arm to receive it. Turn it at an angle with the arm, as in Fig. 6, reversing the angle for the other; and make both clubs fast with small brads. Bore holes in the arms for the connecting rod and thrust the arms just far enough upon the rod to allow moderately free play. Run a screw up through the pivot-stand into the figure's feet, and make the pivot as directed. The more carefully you paint the Indian (with oil colors), the handsomer he will be.


DUTCH WIND-MILL
FIG 1 GABLE TWO OF THIS
FIG 2 SIDE TWO OF THIS
FIG 3 ROOF ONE OF THIS
FIG 4 ROOF ONE OF THIS
FIGS. 1, 2, 3, 4, 5, ARE ½" PINE. FIGS. 6 & 7 ARE ⅞" PINE. FIG 9. ⅞" HARD WOOD.
FIG 5 ONE OF THIS
FIG. 6 ONE OF THIS
FIG. 6-7 TOP AND SIDE VIEW OF BASE PIECES FASTENED TOGETHER WITH SCREWS AND BORED FOR THE PIVOT
FIG 7.
FIG 8 SAIL FOUR OF THIS
FIG 9. THE HUB MADE FROM ⅞" HARD WOOD
FIG 8. THE SAIL MADE FROM THIN BASS-WOOD CIGAR-BOX OR SHINGLE.
F.G. SANFORD

position. You may or may not want to cut out the window seen at A in Fig. 11. Possibly if the window were there some bird might enter and make her nest. Insert the four sails in the hub and procure a ¼ inch rod 7 inches long for an axle to be thrust into a hole bored in the hub. With a bit a trifle larger than the rod bore through the front of the mill and through to the rear, slanting the bit slightly downward, and stopping the boring just before the bit would come through the back. The trifling slant keeps the axle easily in place. After inserting the axle, wind wire around it just inside of the front gable, to keep the axle from coming out forward. Then screw on the roof; and between the post and the base put an iron washer. Finally paint the mill in bright Dutch colors. You will now have a model of a structure that has saved Holland from inundation by the sea, and is typical of her life.

A very presentable but not very complicated WINDMILL WEATHER VANE is shown in these two plates. The illustrations explain themselves so far as the material and the shaping of the parts are concerned. To put the parts together, nail the sides between the gables, as in Fig. 11. Fasten the roof boards together with nails, as in Fig. 10. Screw the baseboards together, and bore the pivot hole. The pivot may be as before a spike with the head filed off. Fasten the frame of the mill to the base with nails driven from beneath. Nail the slanting brace in


DUTCH WIND-MILL
SHOWING CONSTRUCTION AND PLACING ON POST— NOTE THE INCLINATION OF THE AXLE TO BRING THE SAILS PARALLEL— WITH THE FRONT OF THE MILL
FIG 10.
FIG. 11.
POST
POST
F.G. SANFORD

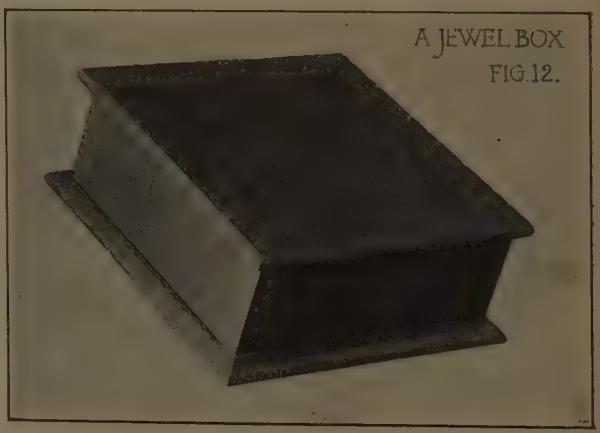


We all have in our possession small valuable objects of one kind or another; and if our own valuables are not sufficient in quantity and quality to induce us to make a JEWEL BOX for them, certainly we know of someone who would enjoy and appreciate so attractive a gift from us. On this page are given the working plans for such a box and a picture of the box completed. Here for the first time in this volume you have plans not of the picture sort but of the sort that professional cabinet-makers regularly draw and work from.

The wood for the box is of ⅛ inch stock, with the exception of two opposite ends, which should be of ¼ inch stock, for convenience in nailing, and for additional strength. Basswood or cedar is suitable material, cedar especially, because of its lightness and pleasant aroma. Of course if you cannot procure ⅛ inch stock, thicker may be used. In this last case, keep to the outside measurements, and let the inside be what they will.

When you have carefully sawed out the seven pieces, and shaped and sandpapered them, nail the four sides together with brads. The thicker ends should be shorter than the thin sides, so that the sides may overlap the ends and be nailed to them. Then nail the bottom on. Where is the seventh piece? It is a piece just large enough to go inside the box, nailed to the cover to keep it in place.

Such a box invites the imagination. Doubtless it was a box very like this that Pandora opened with such direful results.



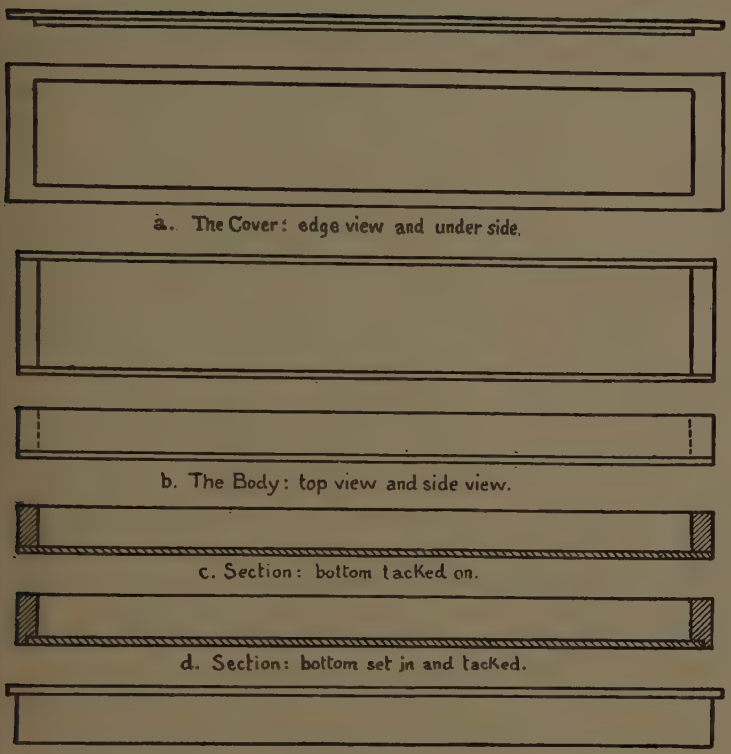

a. The Cover: edge view and under side.
b. The Body: top view and side view.
c. Section: bottom tacked on.
d. Section: bottom set in and tacked.

Fig. 1: The Box: Side view, complete (bottom set in).

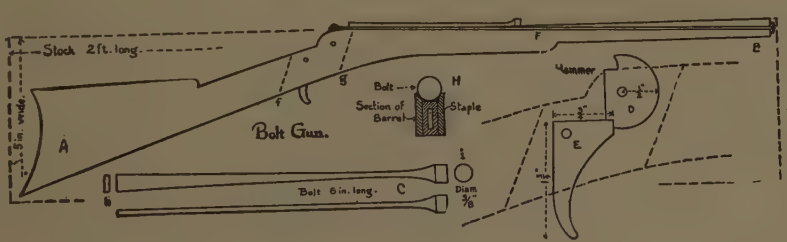
If you visit your friend the cabinet-maker, you will notice that he takes great pains to keep his tools clean and bright, and has special places for storing each one. Often he has manufactured his own planes, — laboriously cut them from sound hard wood and fitted the plane-irons in as exactly as it could be done. Whether or not he has made or mended these tools of his, if he is a good workman he will be fond of them and proud to keep them in good order.

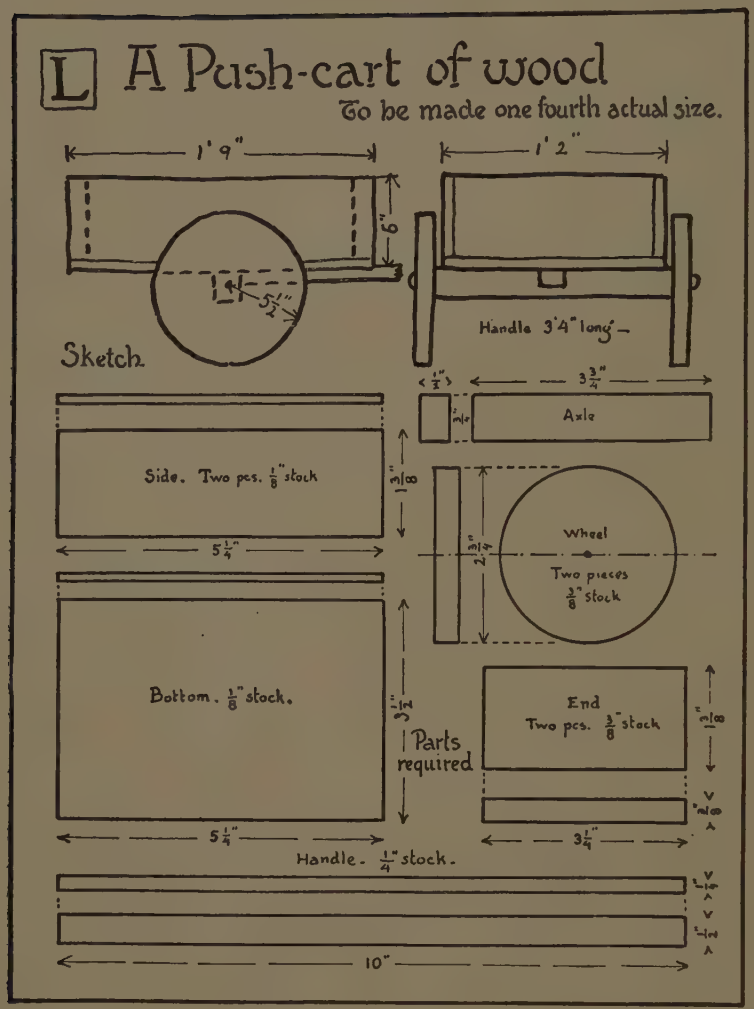
In this he sets us a good example; and one of the things we should make for ourselves is a KIT-BOX for the implements we use in school, for the ruler and the pencils and the crayon holder and the eraser. In making this we shall be going through a part of such an apprenticeship as all good craftsmen used to have to go through, and such as all good craftsmen still want to go through.

The kit-box is to be made of just the same ⅛ inch and ¼ inch wood as that on page 24, and its construction is much the same. In this case the bottom does not project beyond the sides; and the bottom may be either just large enough to "come flush" with the sides — that is, come even with them — or a little smaller, to be fitted into grooves cut out of the sides to receive it (these grooves being called "rabbets," like the grooves in picture frames). In either case fasten the bottom in place with the smallest brads, as large brads or tacks will be almost sure to split the wood. The top, as was true of the jewel box top, is of two pieces, one large enough to overlap the edges slightly, the other small enough to fit closely into the box. Brads might be used to fasten these two parts together, but glue would be better.

No dimensions are given on the drawing, as the box is intended to fit precisely the articles you are to keep in it. But supposing that the length over all is 13 inches, you can find out the other dimensions of a box proportioned just like this one by the "rule of three" or by the use of a drawing scale. You may decide on any dimensions you wish to, and if you make careful patterns of the parts your work will be successful.

Here are drawings that show you how to make a BOLT GUN, with which much fun may be had during long indoor winter evenings. A description of the making is on the next page.

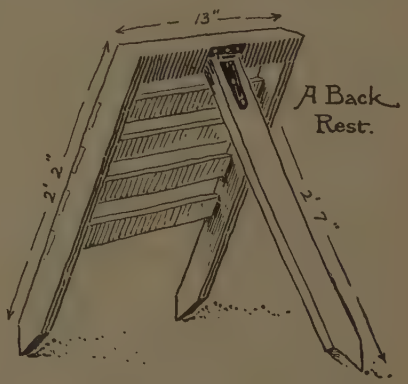




piece, and remove ⅛ inch from its upper edge. Bevel the edges of the thin pieces so that when the parts are brought together again, the barrel will look like the section drawn at H, end view. Then put all the parts together, running brads through the two trigger parts in such a way as to pivot them properly. You will see the wisdom of marking the points at which these pivot brads are to enter, before you finally fasten the stock parts together.

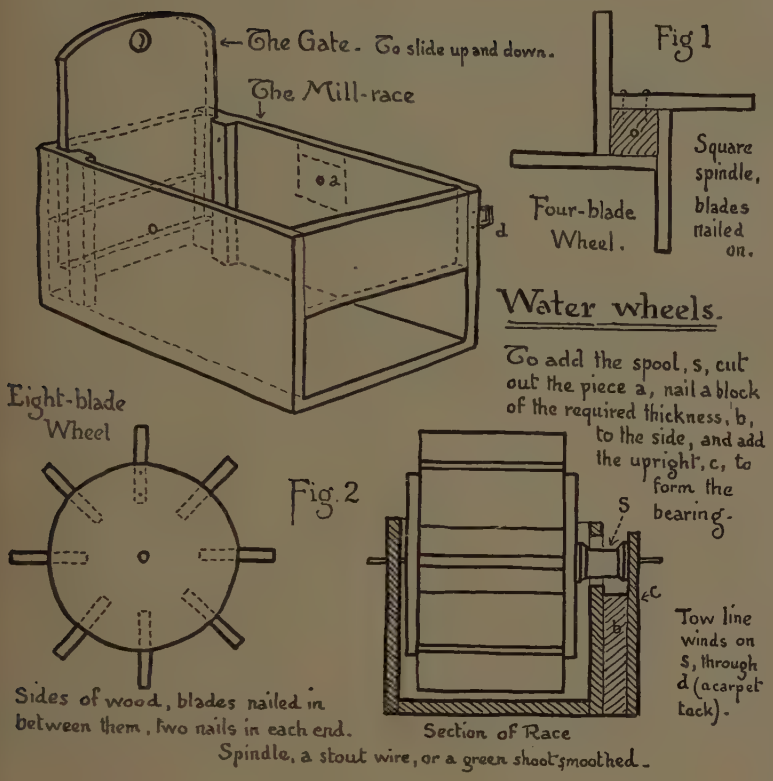
By means of a staple, fasten to the end of the barrel a good spunky rubber band, 3 inches long and ¼ inch wide. With this you can throw bolts of wood as straight as a rifle-ball across the room at a target of paper pinned upon a rug thrown over a chair; and moderate care in the aiming will do away with any risk of damage to the vases on the mantel.

The PUSH-CART shown above may be made without special directions, from the measured drawings of the various parts. This BACK REST can also be put together without instructions.



To make the gun, get two pieces of very thin pine or whitewood board, ⅛ inch thick, 2 feet long and 5 inches wide, and another board of the same length and width, but ¼ inch thick. On one of the thin boards draw the outline of the gun. When this has been whittled or scroll-sawed out, use it as a pattern and cut the other boards accordingly. Tack the three together, the thinnest one in the middle, with three small brads; and smooth the three parts into one gun-stock.

Whittle or saw out D and E, the trigger pieces. Then pry off one side of the gun; and, laying the trigger in position, mark lines *f* and *g*, and cut out of the middle piece a piece along these lines. Then pry off part F of the middle


The Gate. To slide up and down.
The Mill-race
Fig 1
Square spindle, blades nailed on.
Four-blade Wheel.
Water wheels.
To add the spool, s, cut out the piece a, nail a block of the required thickness, b, to the side, and add the upright, c, to form the bearing.
Eight-blade Wheel
Fig. 2
Tow line winds on s, through d (a carpet tack).
Sides of wood, blades nailed in between them, two nails in each end.
Section of Race
Spindle, a stout wire, or a green shoot smoothed.

Here is a page of WATER WHEELS. When spring comes around and the brooks are full, there is nothing that 's much more fun than to make a stream of water work for you and turn your mill-wheel. The first thing is to get a box about ten inches wide and sixteen inches long, with a depth to suit the particular brook that is to be harnessed. Take out the lower half of each end, and make a gate that will slide up and down between one end and two strips nailed to the sides. The easiest wheel to make is one with four blades nailed to a square hub; but a more desirable one is that of eight blades. This may be set simply between the sides; or a spool may be introduced as described in the diagram. This spool will set a series of spools in motion by means of belting; or it will act as a windlass that will wind up a tow-line and haul a small barge upstream, bringing moss and pebbles for repairing the masonry about the mill. To heap stones and moss so that all the water of the brook will run through the raceway is perhaps more than can be managed; but if a fair proportion runs through, the wheel will turn merrily and do a good deal of work in its own small steady way.

If there is a mill near your home, where a turbine wheel is used to drive the machinery, or better yet, if there is a much older mill where the old-fashioned water wheel still runs, get the miller or the engineer of either place to take you down where you can see the wheel pit. In the case of the turbine wheel, you will see a contrivance of iron; in the case of the older mill, a much larger wheel in proportion to the size of the mill. But you will have learned a lesson on the handling of water power that you will think about a long time. Water, like fire, is a reliable and enduring servant.

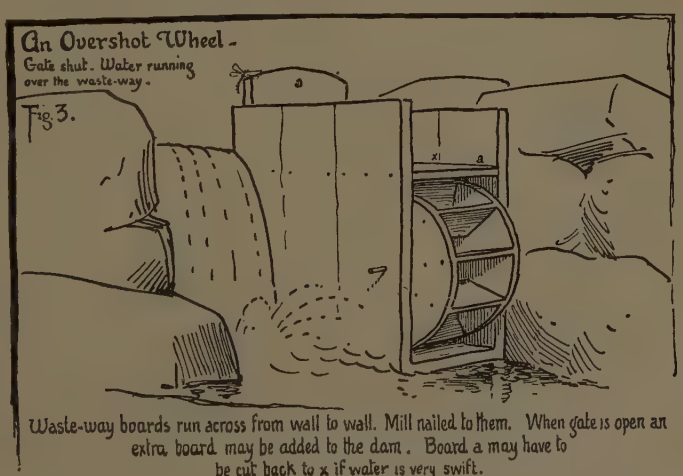
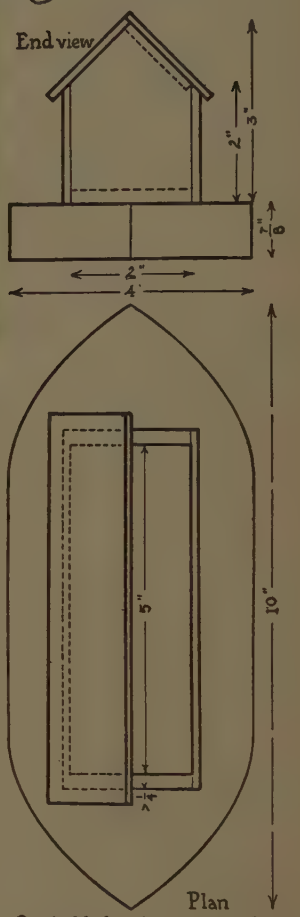

An Overshot Wheel.
Gate shut. Water running over the waste-way.
Fig 3.
Waste-way boards run across from wall to wall. Mill nailed to them. When gate is open an extra board may be added to the dam. Board a may have to be cut back to x if water is very swift.

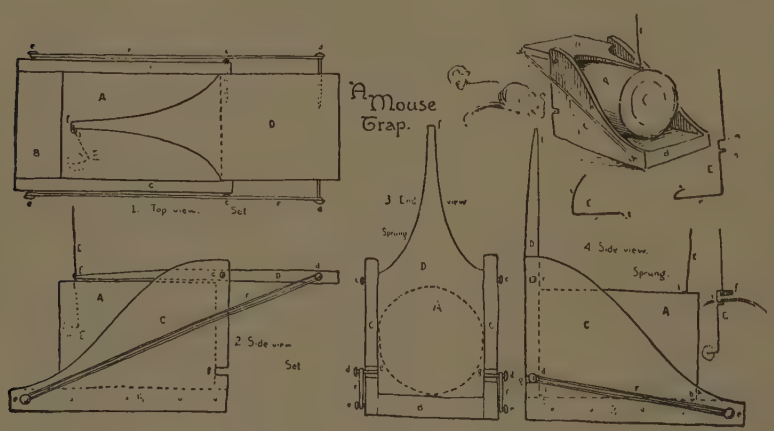
Fig. 9. Noah's Ark

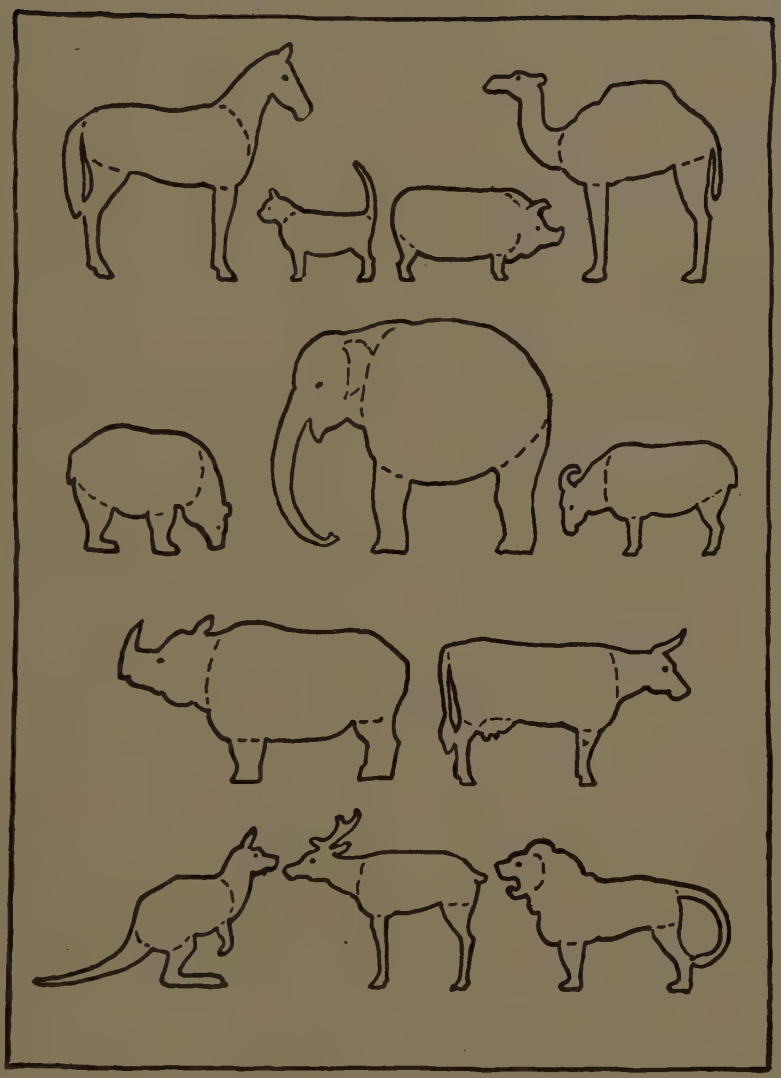


One-half of roof removed to show the interior.

Before we consider the Noah's Ark, let us look into the matter of a MOUSE TRAP. Below you will see a trap that may be made out of a tin can. Hammer down the rough edges of the can and measure the diameter and length of it. Get out a baseboard, B, ½″ thick, and two thinner sides, an inch higher than the can. The door is then to be made and pivoted in place. If a trigger in the form of a wire bent as in E be set in place, it will hold the door open until it is disturbed by a mouse and allows the stout elastic bands to close the trap with a bang.

The NOAH'S ARK is not so hard to make as might be imagined, and it is a most delightful toy. Begin with the bottom of the house, two by five inches, and build around that. You will need two duplicate gable ends and two sides and two roof pieces, almost everything being two by two in this ark as should be the case in every well-regulated ark. You will notice that one roof piece is nailed in place, while the other is left removable, and is caused to stay in place by means of an extra piece glued to its under side (see dotted lines in end view). The boat is sawed and shaped from a ⅞″ board. The parts should all be put together with brads. Once together, the ark should be painted in bright colors. The deck, as you will see in the illustration, may be lined out with different colors; and there should be a painted window at each end, or how could the dove get out? It would be a pity not to have Noah and his family, as well as the animals which are to be explained on the next page, and do you think you could whittle them out? It is not difficult. Short pine sticks are easily carved.

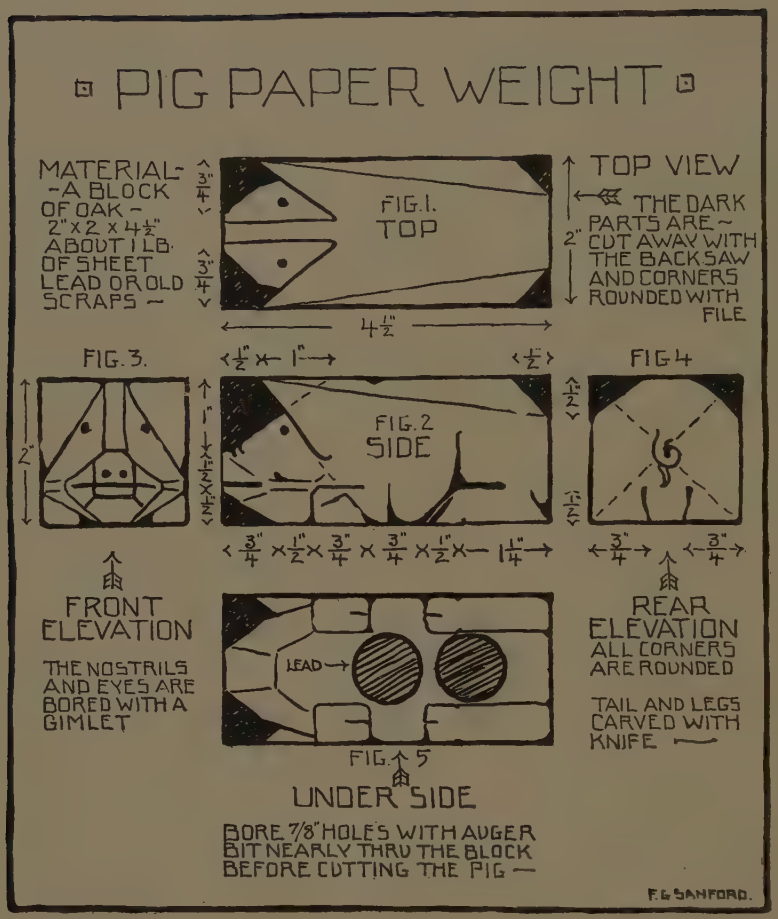




There is a wide field to range when it comes to selecting and making the animals that are to be the inhabitants of our ark. Here on this page are given designs for what will be surely a sufficient number to start with. The outlines are extremely lifelike, and the effect is especially real when the figures are made up of three thicknesses so that they will stand.

First of all make your patterns. If you decide to make the animals of just the size shown on this page, trace off the outlines on very thin paper, and transfer them to the wood by using carbon paper. Get some pieces of very thin wood, and select three pieces that will match up pretty well in size for one of the figures. You may have to saw them a little. Wood such as the school chalk boxes offer, is a handy gauge for this work. Nail these pieces lightly together with small brads, and lay off the pattern on the top piece. Then cut out all three together. The pieces are then to be taken apart, and certain of them changed. In the case of the elephant, for example, the two outer thicknesses of the head part should be cut away, along the line indicated in the diagram; while the middle piece should have the head left on, but the legs cut off. In each case, you see, the center-piece is to bear the head, and the outside pieces are to bear the legs. Where there is a tail, that also is to be on the center-piece. When the parts are cut out according to this scheme, they should be glued together; and when they are set, the sharp edges may be rounded off and as much carving done as you care to try. Finally comes the coloring. This should be done with oil colors, preferably, as these colors have a rich appearance. It is better not to try to make many gradations in the color of any one animal, simplicity being safer and more attractive.

If you should get all of these animals made and desire more, patterns for others may be found scattered throughout this volume. But before you begin your search for these other models, remember that it is best to have two of each.


PIG PAPER WEIGHT
MATERIAL—A BLOCK OF OAK— 2" X 2 X 4½" ABOUT 1 LB. OF SHEET LEAD OR OLD SCRAPS —
FIG. 1. TOP
TOP VIEW
THE DARK PARTS ARE— CUT AWAY WITH THE BACK SAW AND CORNERS ROUNDED WITH FILE
FIG. 3.
FIG. 2 SIDE
FIG 4
FRONT ELEVATION
THE NOSTRILS AND EYES ARE BORED WITH A GIMLET
LEAD
REAR ELEVATION
ALL CORNERS ARE ROUNDED
TAIL AND LEGS CARVED WITH KNIFE
FIG. 5
UNDER SIDE
BORE 7/8" HOLES WITH AUGER BIT NEARLY THRU THE BLOCK BEFORE CUTTING THE PIG —
F. G. SANFORD.

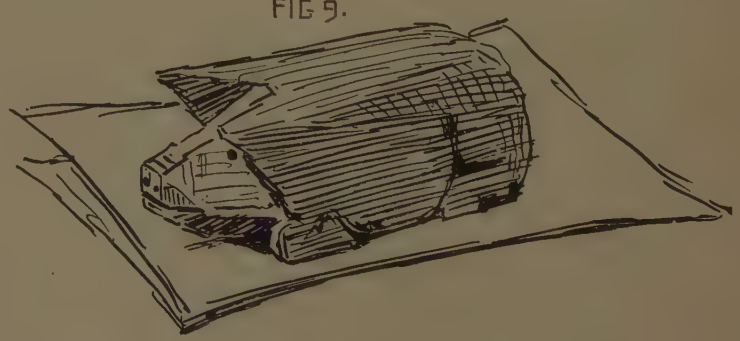
Too bulky for the ark, but not too large for the desk where the wind is likely to blow papers about, is our friend the small PIG PAPER WEIGHT whose portrait is below. He may be made of hard wood or of soft. If oak is used, much of the cutting will have to be done with a backsaw. This is a saw having fine teeth and a thin blade reinforced by a heavy fold of steel over its upper edge. It is used for fine cutting and in miter-boxes, which will be explained later on in this volume. A small size backsaw will be best for this job.

As soon as you get your block of oak cut to size, bore in it the two holes seen in Fig. 5. If the wood splits or the bit comes through, there is nothing for it but to try a new piece.

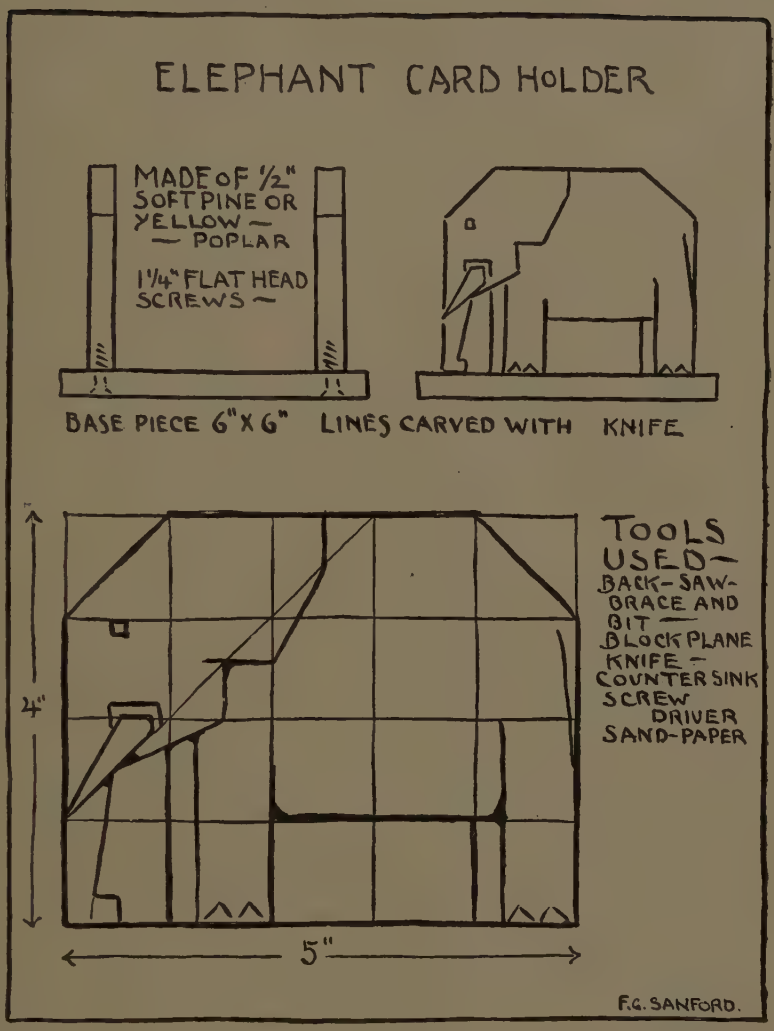
With these holes properly bored, go ahead with the shaping of the animal, first drawing on each face of the block the lines shown in the five figures in the plate. When the corners have been cut away and the various limbs and features have been simply carved with a jackknife, pour solder or lead that you have melted over the coals in an old ladle, — oiling as a finish. Piggie is naturally one of the cleanest of animals, and when allowed to roam free he shows this in his habits. He must root or die, and it is not his fault if we confine him where mud of the worst sort forms, and leave him to root in it. Nor is he one bit greedier than the other animals of the farm, if left in the natural state. We make him so by catering to his fatty growth.

Therefore, all in all, he is a cleanly, temperate and very useful animal. He will clear new land of roots or rattlesnakes. Is he not a worthy symbol of thrift and usefulness? Look at his lean brother, the southern razor-back.

FIG 9.



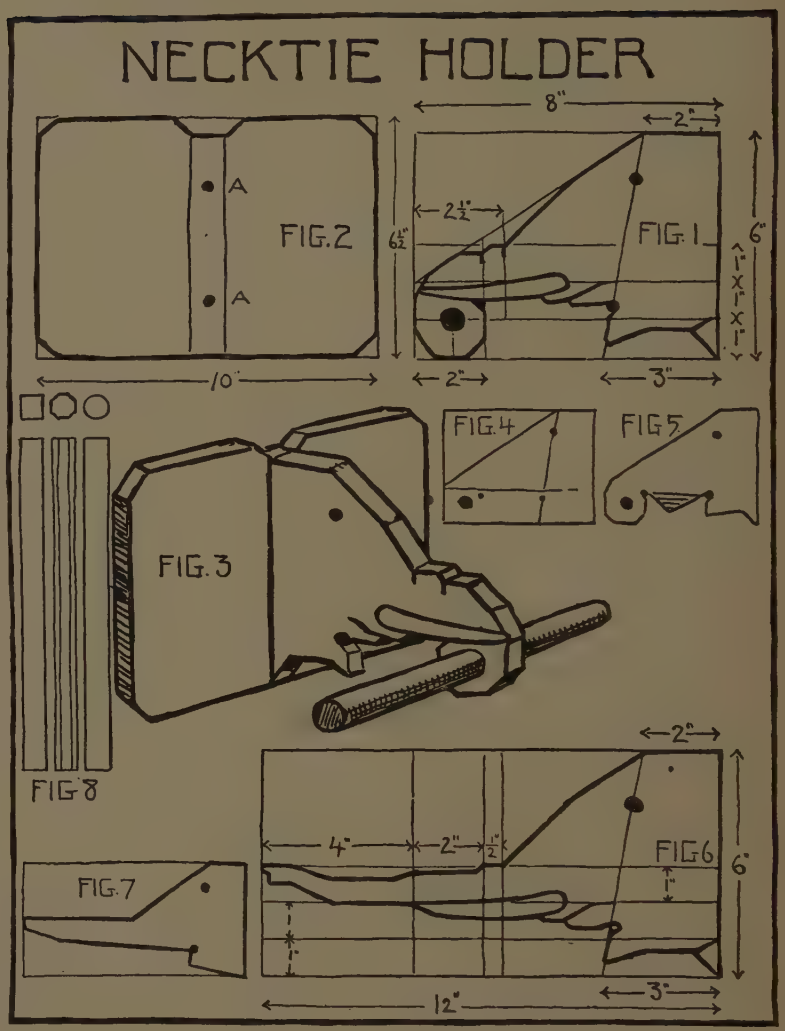
When your mother's next birthday is about two weeks off, begin to plan what you will make for her. She will be pleased with anything you make, to be sure; but she will be especially pleased if the present is novel and ingenious and of practical use. Such a gift is the CARD AND LETTER HOLDER here illustrated.



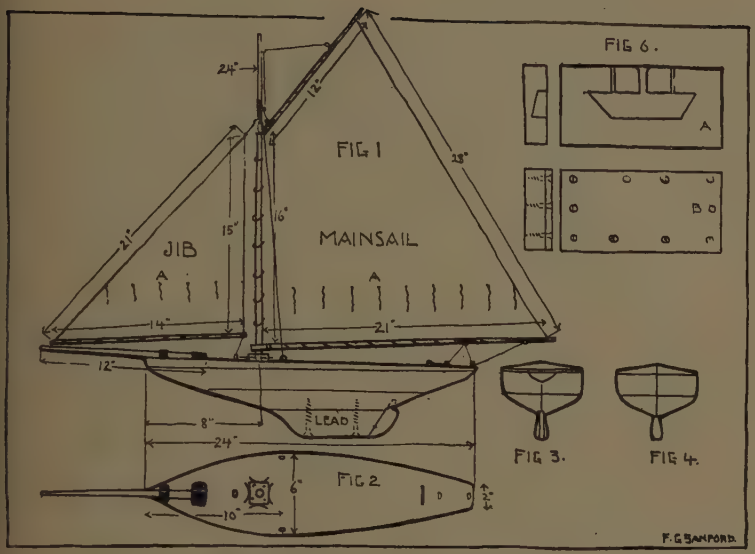
In the first place saw out the base piece, six inches square; and plane and sandpaper it perfectly smooth. To locate the holes for the screws that are to hold the elephants in place, draw on the bottom of the base parallel lines, each ¾" from opposite edges. On this line bore two holes, one two inches from one end, the other one inch from its end. To allow the heads of the screws to sink well into the wood, widen the lower ends of the holes with a countersink, — a special bit that fits within the auger.

For the upright you will need two pieces of half-inch wood, four by five inches. Make sure that these pieces have one edge accurately planed at right angles with the sides, so that when this edge rests squarely on the baseboard, the elephant will stand exactly straight. Then mark off on each of the pieces the outline of the elephant, after first lightly drawing the inch squares that serve as guides. If you had the use of a large band saw or of a foot-power scroll saw you might cut out both figures at once. Otherwise it will be necessary to cut each separately. When these are cut, round the edges slightly, and carve out the lines for legs, toes, ear, tusk, and eye.

The elephants should be painted or stained, and you have your choice of simply varnishing or shellacking them or of giving them a thin coat of drab gray. If the latter, the painting should be done before the parts are put together, for in any case the base should be varnished or painted black. If, however, you choose shellac, or a brown stain plus shellac, you can fasten the parts together at once. Touch the feet with glue, set the figures carefully in place, and let the glue dry. Run a gimlet up through the holes in the base and start holes in the legs for the screws that are to hold the uprights firmly. With a piece of baize glued to the bottom, your holder is ready to stand on your mother's desk and contain odds and ends of cards and letters.



A NECKTIE HOLDER that will attract the attention of everyone who visits your room may be made in the form of an elephant's head with extended ears; and the plans on this page indicate the method of manufacture. The wood used may be pine or poplar, bass or gum, chestnut or oak. The last named take the finest finish. The material for the ears should be half-inch or three-quarter inch stock, and that for the head and cross-stick seven-eighths. First cut out the squares needed, and bore in them the holes indicated in Figs. 2 and 4 in solid black. The largest hole, which is for the stick, should be bored with a ¾″ auger bit, and must be perfectly straight. Start the hole from one side, the block being held horizontally by its longer edges in a vise, if you have a vise, — and if you lack a vise, ask the hardware dealer to show you the irons he sells at a reasonable rate for making a vise. When the bit just starts to come through the other side, turn the block over and complete the boring in the opposite direction. This, by the way, is always a good way to bore a hole when both sides of the wood are to be smooth and finished; since, as you will soon learn, a bit will not go through and come out the other side without leaving splinters. For the smaller holes a $\frac{3}{16}$″ drill bit is large enough. The eye-hole is only a shallow start on either side. As soon as the holes are bored, mark the pattern on the parts and with the back-saw cut off the various corners. Fig. 5 shows how to cut in for trunk and mouth and where to remove some of the intermediate wood with a chisel (where the short lines are put in). Chisel and jackknife are to be used in completing the carving shown in Figs. 1 and 3; and when this has been done, sandpaper should smooth all surfaces, and reduce the sharpness of edges, without rounding them much. The stick is most easily made of a 9″ or 10″ length of ¾″ dowel rod. If this cannot be obtained, a square stick may be planed or whittled, and then sandpapered quite perfectly round. The rod should be made to fit easily in the trunk hole, so as not to split it. Stain the head brown or black and paint the tusks a cream white. Join the parts with 1¾″ flat-headed screws. Hang by screw-eyes. Another holder is shown at Figs. 6 and 7.



PLANS FOR A TWO-FOOT SLOOP-YACHT

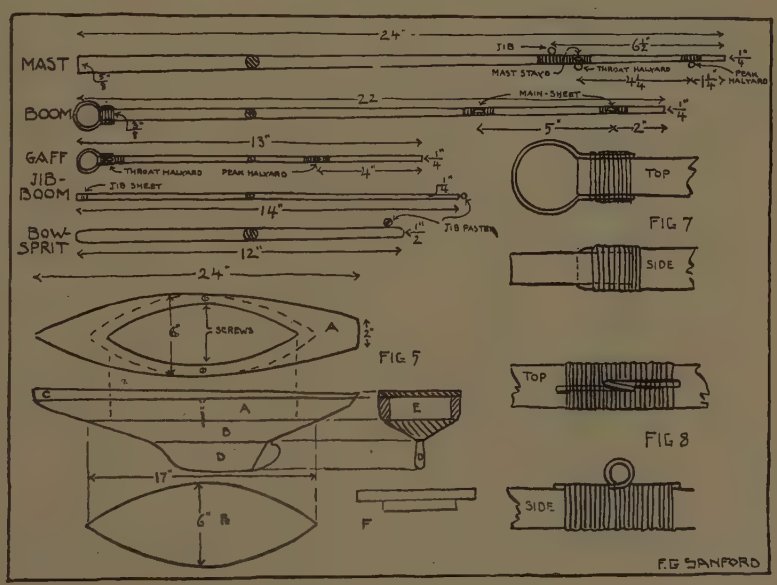
Here are the plans for a YACHT with a full set of working rigging. It will look handsome in winter on your bureau or on a wall-rack specially made for it; and what is more to the point, it will sail, being considerably different from those vividly painted make-believe yachts sold in toy shops, that lay their sails flat in the water under the slightest breeze.

The hull is made of two pieces, with a third piece for a deck. It could be of a single block, but it is hard work to gouge out the inside of a big block; and besides, it is fairly hard to get hold of a clear-grained block. The hull, as you know, must be hollow, in order that it may be lighter than the solid wood, and so allow for the weight of the keel. The lighter the hull, the heavier the keel may be; and the heavier the keel, the stronger its power of righting the vessel and the greater the sail-area that may be used in a stiff breeze.

First cut the deck plan from paper folded lengthwise. Ten inches from the bow end of the fold mark a perpendicular line three inches long. Through the end of this line shape a curve meeting both bow and stern as much like the curve in Fig. 2 as you can. Cut along this line, unfold, and you have a pattern for the deck and for the upper section of the hull. Cut pattern for the lower section of the same width, but 17″ long, like B in Fig. 5. The two hull pieces are of 1½″ pine, and the deck piece is of ⅞″ pine planed down to ¼″ at the stern. Lay out the patterns on the wood and cut to line with saw or spokeshave, or else plane the wood down, leaving the sides straight. Then mark the opening in A, Fig. 5, ½″ smaller than B, so that B will overlap.

If you were planning a model deck, with its proper openings for the cockpit, the cabin and foredeck, this method shows you how you could get a good start, and save yourself much tedious gouging out or whittling.

When the opening has been cut out by boring

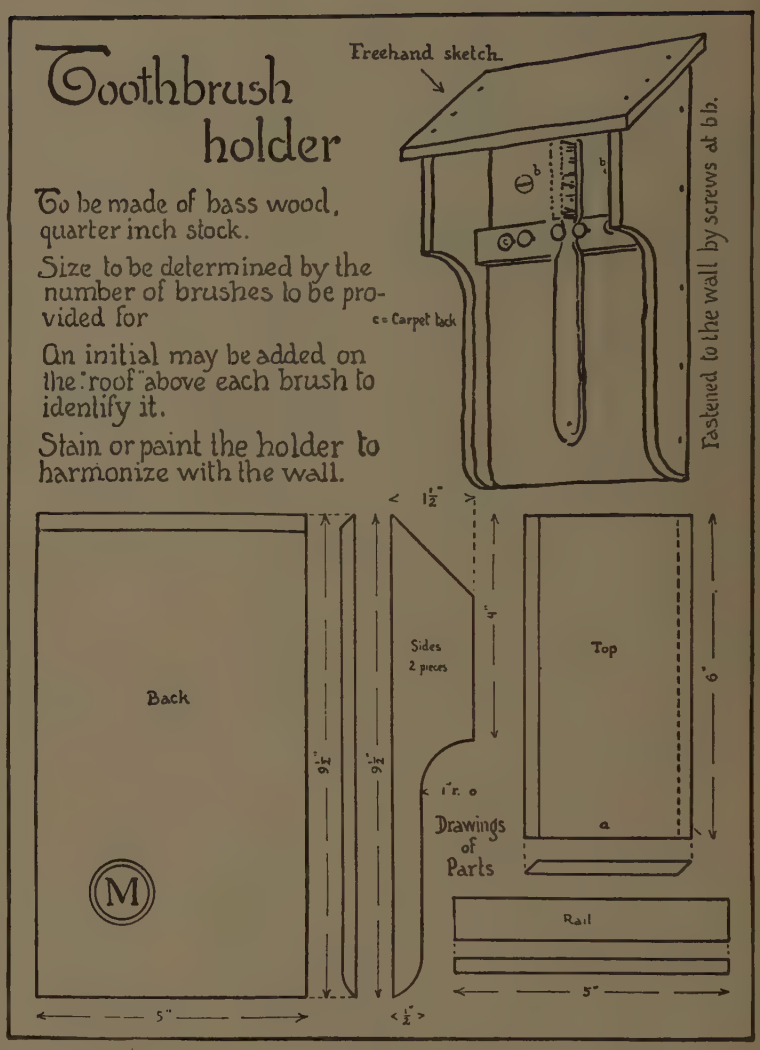


a series of ½″ holes around the edge and sawing through these with a key-hole saw and smoothing off the projections with a rasp or knife, fasten A and B together with thin screws, as in diagram. Then with saw and spoke-shave and knife and rasp and sandpaper, smooth off the hull into the fine lines of a racer, lines that will enable the hull to cut and leave the water easily and with the least possible friction. Then take apart A and B, apply white lead to the joints and screw them together again. Likewise fasten on the deck, and smooth any rough places.

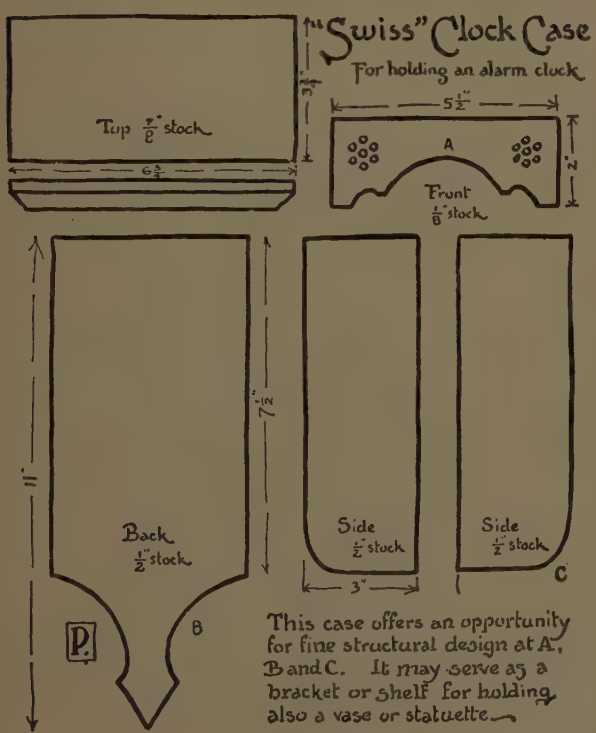
In Fig. 6 (p. 33) is shown the way to make a mold for the leaden keel. The mold is cut with a chisel from a piece of 1½″ plank, ½″ deep at the top, ¾″ at the bottom. Bore three holes through the upper edge of the mold, the center one ½″ wide and countersunk, in which to pour the melted lead or solder, the others smaller, to let the air escape. Cover as shown. When the keel has been cast, a wood-drill (not the ordinary bit) will bore holes for the screws, and the keel may be rounded and smoothed with a file and fastened in place. The rudder should be of wood, set at the top into a shallow hole bored into the hull and fastened to the keel by flexible wire looped through small awl holes in both parts. Finish the whole with a thin coat of white lead, one much thicker, and a final coat of varnish paint.

The spars are all shown in the diagram, and the way of binding the brass-wire loops on them with strong thread, and so on, is sufficiently clear. The mast is stepped in a piece of ⅞″ wood about 1½″ square screwed to the deck, and provided with brads in the edges to which the rigging is to be made fast. The sails are made of lightweight bleached muslin. Cut the patterns from wrapping paper, and then in cutting the cloth allow ¼″ all around for hemming. After hemming, sew brass curtain rings at intervals along the luff of the mainsail. The sails are made fast to the spars by over-and-over sewing with stout linen thread. Reef points and other rigging, all of fish line, are then to be added in accordance with the diagram. When all this has been done, you will have a dandy little sloop, that will hold her own in races on pond or ocean.

A TOOTHBRUSH HOLDER like the one in the plan above may be made of ¼″ basswood.

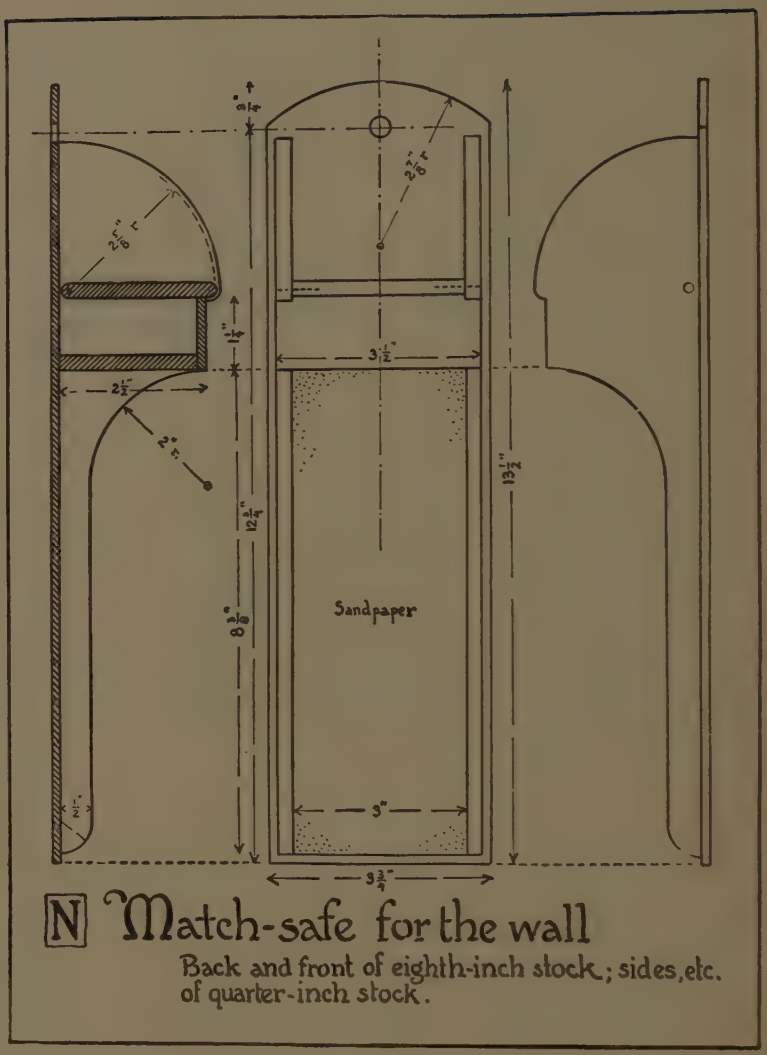

Toothbrush holder
To be made of bass wood, quarter inch stock.
Size to be determined by the number of brushes to be provided for
An initial may be added on the roof above each brush to identify it.
Stain or paint the holder to harmonize with the wall.
Freehand sketch.
c = Carpet tack
Fastened to the wall by screws at b b.
Back
Sides 2 pieces
Top
Drawings of Parts
Rail
5″
6″
4″
9½″
11½″
1½″
M

The process of cutting out the pieces involves nothing new or difficult, except perhaps the "beveling" of the edges of the back and top parts. The only difficulty here lies in getting just the angle you want, and in getting the angle uniform. If the parts are held in a vise, and set perfectly straight in the vise, the difficulty will be much lessened. It is a good idea when you are planing on the bevel to run your pencil along the edge that is to remain, and to draw a line on the other side of the wood to represent the new edge when the beveling is completed. Brads hold the parts together; brass-headed upholsterer's nails fasten the rail to the back and hold the brushes, and screws fasten the whole to the wall. The holder should be stained or painted either in the same tone and color as the wall, or in the same color as lighter or darker, or in another color, that goes well with it. Sparking enamel white as a lining color is most attractive, and might well be the color for the outside too.



On the last page, at the bottom, is shown a photograph of a wooden CLOCK CASE, and plans for the making of it. There is opportunity here for the use of handsome wood, like quartered oak; though it is to be remembered that until you are pretty well accustomed to tools, oak is a hard wood to work in curves. In whatever wood you use you are not bound, of course, to adopt the curves given in the plan, but may make your own, remembering to fold the pattern paper and cut out half a pattern from it which when unfolded will be a whole pattern with sides that are just alike.

On this page are given the drawings for a wall MATCH-SAFE such as you see in the picture on the page before. You will notice that the curves are not precisely the same; but that does not matter. In fact, it would be an excellent scheme to make a match-safe for four or five rooms in the house and have each one a little different from the others.

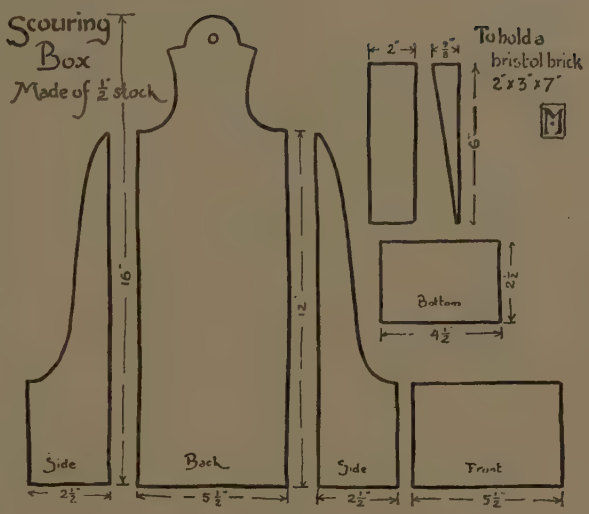


N Match-safe for the wall

Back and front of eighth-inch stock; sides, etc. of quarter-inch stock.

It is well to have the dimensions of any match-safe you may make about those given in the plan, for these dimensions are well suited to the length of matches, and also to the average length of "scratch." Sometime notice a wall that has been "uglified" by careless scratches of matches and see if this is not so. The sandpaper should be comparatively fine, No. 0, for example. The cover of the box will swing on brads or ordinary pins pounded into the cover and working freely in the awl holes bored in the sides. Here are two suggestions for improving the match-safe. First, provide a hole near the very bottom for a second screw to keep the safe from swinging. And second, put a partition in the box, so that new matches may be kept in the front half and burnt matches in the back half. A simple dark color will be most suitable for this wall match-safe, say black or a golden-brown wood stain.

A word of warning as to the modern match will not be out of place here. Avoid those brands known under the head of "snap" matches, as they have been declared to be dangerous by more than one competent authority. Use the simple scratch match, which is often a little slow in lighting, but all the safer on that account. To be doubly certain that matches do no harm in the box, it is well to fit in a tight lining of tin.



At the top of this page is a drawing of the parts of a SCOURING BOX. The box is to hold a bristol brick, a cloth and a cork, all useful in cleaning knives, pans, and other implements. There is no complication about the making of this box; but since it is to stand constant hard use it would be worth while to put the parts together with brass screws instead of with common brads or nails. Brass screws will hold against any ordinary strain, and will not be injured by water. In screwing one piece to another, the rule is to bore a hole clean through one piece large enough to let the threads and body of the screw past. The threads should get all their grip upon the second piece, in which they are given a start by means of a gimlet, or by being tapped in a little way with a hammer. Unless the holes are bored all the way through one part, it is very hard to bring the two parts tightly together. Try some experiments with both methods, and notice the difference.

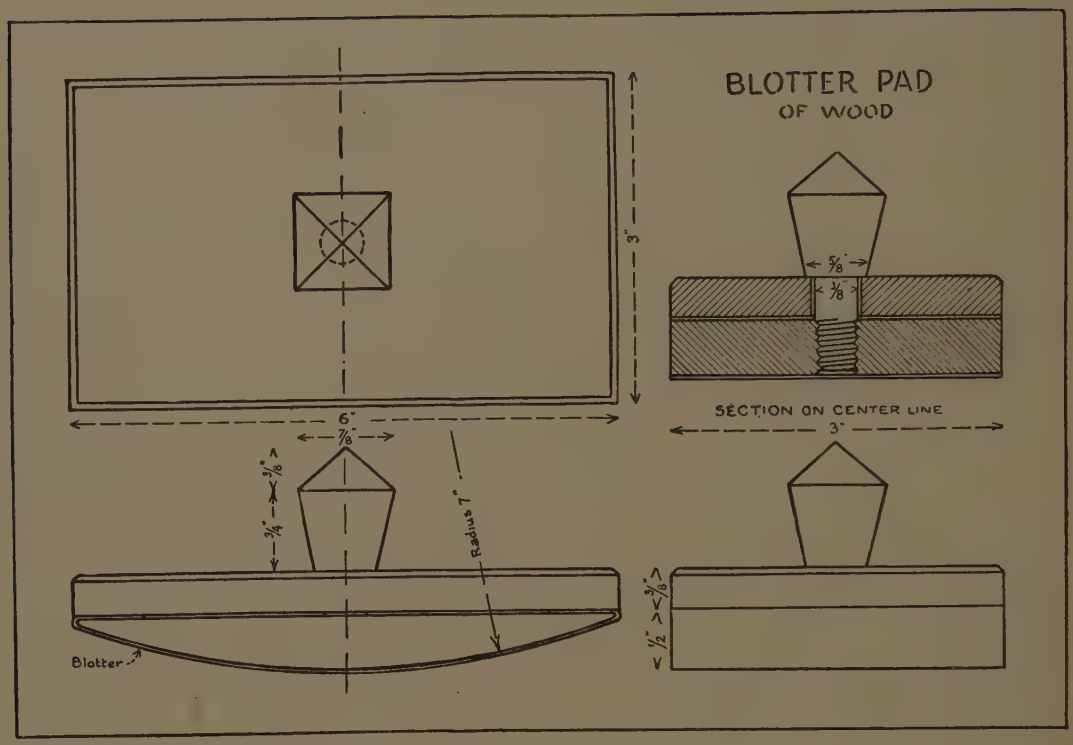
When very small screws are to be used, the holes should be bored with a wood-drill rather than with a regular bit. If you wish to add a fascinating tool to your kit, buy a ratchet screw-driver and the set of drills sold with it. These drills come usually in sizes from $\frac{1}{16}$ of an inch upward; and they will make a clean hole through thin wood without splitting it.

The Chinese and the Japanese, by the way, are very fond of fastening light, small pieces of wood together by boring holes and using wooden nails, or pegs. It is to be doubted whether they have ratchet screw-drivers, but they have plenty of bamboo pegs, and some way of boring suitable holes; and you will find even the frames of their screens pegged together, with glued wooden pegs.

There is something attractive about the idea of fastening wood *to* wood *with* wood. Such fastening will stand the test, too, as is proved by its use in the building of wooden vessels. Visit a shipyard where they are building schooners of the stanch, old-fashioned type, and you will find them boring with ship's augers holes a foot and more deep into which they drive heavy oaken spikes. The picturesque name of these spikes is "tree-nails," though this name has been so mishandled in being passed down from father to son among the ancient race of shipbuilders that it has finally become "trunnel." When the shipwright has driven a trunnel home and cut it off and planed it down flush with the planking, he drives a chisel into the pin, across the grain of the planking; and into the cleft he drives a wooden wedge, as an extra precaution against the pin's starting. Think out for yourselves his reason for not using glue, and his reason for making the cleft for the wedge across the grain of the planking, instead of with it.

It would pay you to try wooden pins as fasteners for some of the small articles described in this volume, where the directions call for brads. You can use matches and toothpicks, and fix them in place with glue.

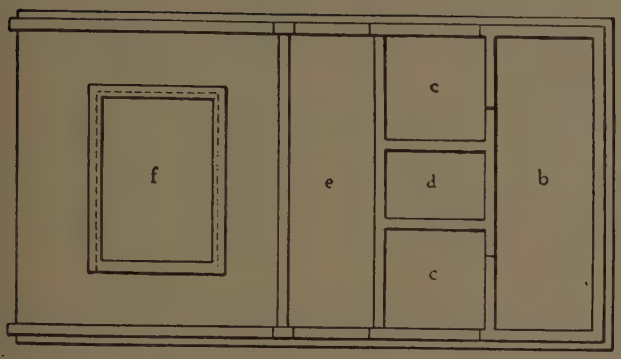
The scouring box is a very old kitchen institution. Before the days of modern sand soaps, dirt had literally to be scoured off.

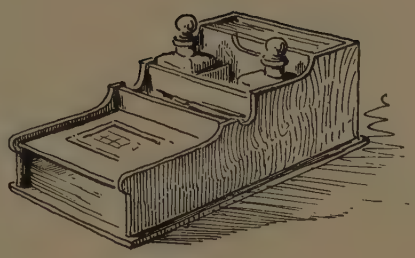


A particularly good thing for a Christmas present would be a BLOTTER PAD like the one above. Very likely we are accustomed to think of such a thing as distinctly a professional-made store article. But if we use all our skill and care we shall find it within our powers; and the desk already adorned with an elephant letter rack (see p. 31) may have this additional adornment from our work-bench.

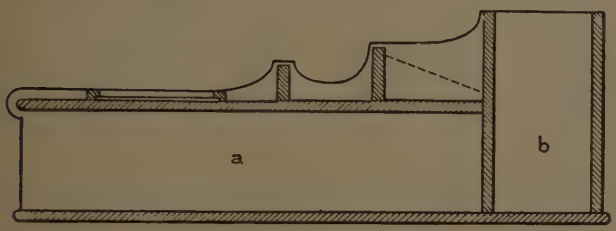
First cut the top "to measure"; that is, according to the dimensions in the diagram. Draw lines from corner to corner, thus locating the center. Here bore a half-inch hole. Bevel the upper edge of the top to prevent its being easily nicked. Now is the time to invent some simple geometrical design and draw it on the top, carving out certain areas and leaving others in relief. Suggestions for such designing will be found elsewhere. The top should be $\frac{3}{8}''$ thick. The bottom $\frac{1}{2}''$ thick in the middle and tapered in as nearly a perfect curve as possible. This tapering may be done roughly with a plane or with a $1\frac{1}{2}''$ chisel called a firmer, the work being completed with sandpaper. It will be much more likely to come out well if a pattern is cut from paper folded in the middle and then unfolded to make the two curves absolutely symmetrical, the paper pattern being used for marking the curve on both sides of the block that is to form the under-piece. When the under-piece is shaped and smoothed it should be placed beneath the upper, in order that the center of the hole may be marked on it. Then with a screw-box and a $\frac{1}{2}''$ tap threads should be cut in the $\frac{3}{8}''$ hole that has been bored in the center of the bottom and on the knob that has previously been whittled. As you will probably not possess the thread-making apparatus, you may have these threads cut for a small price by a cabinet-maker. All that remains is to stain the wood, give it a wax finish, procure the blotting paper, cut it to lap over between the parts an inch or so, and screw down the knob.

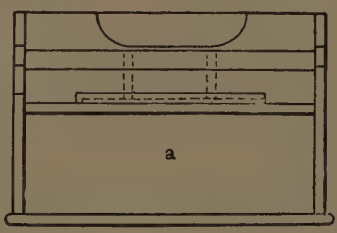
A screw-box and $\frac{1}{2}''$ tap with which to cut the thread on this knob or handle would both be good things to own, and you could buy them for about 90 cents. If you want a true curve on the bottom, it will be found correct for this size on a radius of $5\frac{1}{2}''$.





Writing Kit.



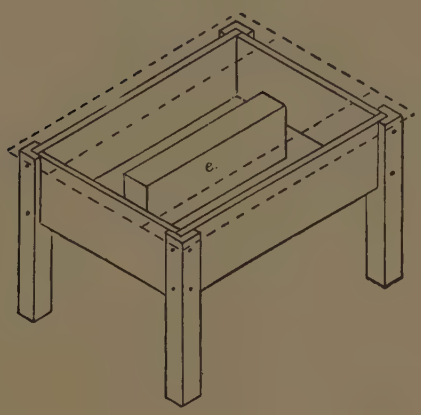


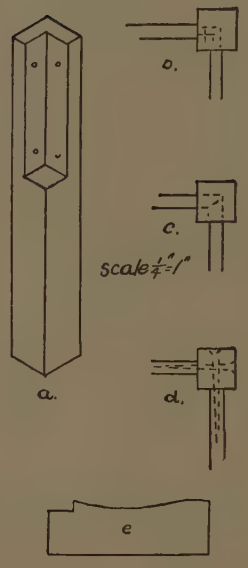
To make this WRITING KIT, you will need a considerable supply of quarter-inch basswood and some one-inch brads. In addition you will need only your workshop and a supply of ingenuity and gumption.

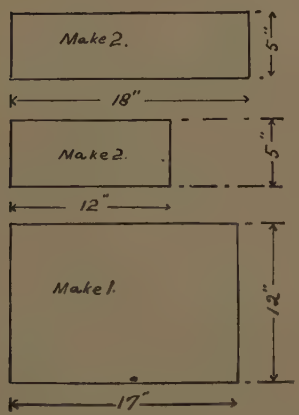
You will notice that no dimensions are given on the drawing. That is because each kit should exactly accommodate some one style of paper and envelopes, whatever that may be, and two already purchased ink bottles. The first thing, then, is to get the ink bottles, one for black ink and one for red, and samples of paper and envelope. With these articles at hand, and a foot rule, it will be possible to work out the dimensions. For example, the width of the baseboard will be the length of the envelope plus $\frac{1}{4}''$ to allow for space at the ends of the envelopes plus $\frac{1}{2}''$ to allow for the two $\frac{1}{4}''$ sides plus $\frac{1}{2}''$ to allow for a $\frac{1}{4}''$ overlap all around. The baseboard will thus be one inch wider than the envelope is long. Keeping the general proportions of the diagram, we shall make the envelope box one-third as wide as it is long; and its height will be $\frac{1}{8}''$ greater than the width of the envelopes, for they are to stand on edge. Compartments *c*, *c* are for the ink bottles, and should be just wide enough to produce a reasonably snug fit. Compartment *e*, for pens and pencils, should be a trifle less wide than *b;* say a half-inch narrower. Compartment *a*, which, as you will see in the side view below, extends to the wall of *b*, should be a half-inch longer than the length of the paper. Space *f* is a light frame to hold a calendar slipped in from the side. Having cut out all the parts, you will have to calculate how to nail them together. For example, to the top of the paper compartment will have to be nailed the inner wall of *b*, and to that must be nailed the partitions between *c*, *d*, and *c*. Then the wall between *c*, *d*, *c*, and *e* is nailed to the just mentioned partitions and then to the top of the paper compartment. Then go on, and so forth.

Allow the sides to come $\frac{1}{8}''$ higher than the partitions, — see the view *a*, *b* for a finish. Sandpaper the edges of the sides so as to beautifully round the top. It would save time in the end to bore holes through the side wherever brads are to be driven. When all is in place, it is time to apply a dark stain and then a wax finish. You can buy wax furniture polish, or you can buy beeswax; dissolve it in turpentine and apply with a rag. And now, just to remind you: *a* is for paper, *b* for envelopes, *c*, *c* for inks, *d* for pens, *e* for pencils and holders, and *f* for a calendar, that little article that is so exasperating by its absence.

A Strong Shoe Polish Box.





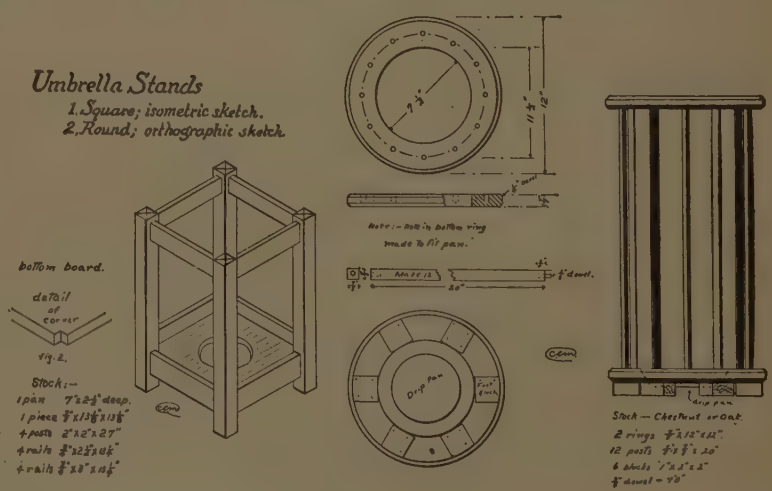


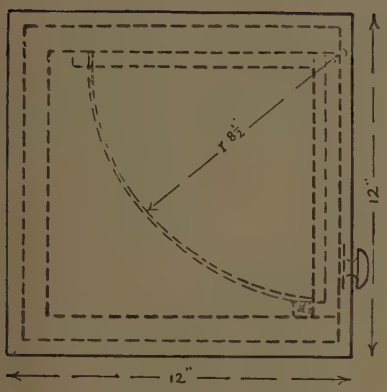
Box 5"x13"x18" outside measure.
Legs 4(1½"x1½"x12")
Top ⅞"x15"x20" made in 3 parts.
Polish Block 1(2"x4"x12")
Joints for legs choice a, b, c, d.
b=Mortise + Tenon. c=Housed.
d=Butt.

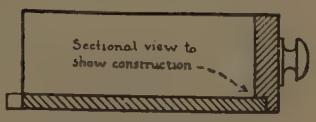
CEM 1898.

Of the four ways of managing the joints at the corners of this SHOE POLISH BOX, the lap joint shown at *a* is the best. To make the box with such joints, cut out the parts of the measurements given, using for the box half-inch pine or other wood. Nail the sides of the box to the ends with 1½" brads. Set the bottom inside and nail it in place. Then attach the legs one at a time with screws (1¼" No. 10 blue round-headed), being careful not to let the screws run into each other. The box will be especially strong because the bottom will rest at the corners on the posts and not simply be held by the sides. The foot-block goes in place after being shaped, and the box-top is formed of 3 pieces of ⅞" stock, with 15" × 20" as over-all dimensions. The middle piece, 8" wide, may be hinged to one of the nailed on side pieces; or it may be cleated underneath so as to stay in place.

Here are sketches for two UMBRELLA STANDS. In both of these the joints are butt joints. In each end of each of the cross-pieces sink shallow holes and in these glue short pieces of dowel. Dowels should be just long enough to give a good bearing into holes bored into the sides of the four posts. Be very accurate in boring these holes to match the dowels; and do not have them but a trifle deeper than the dowels, just enough to allow for the glue.

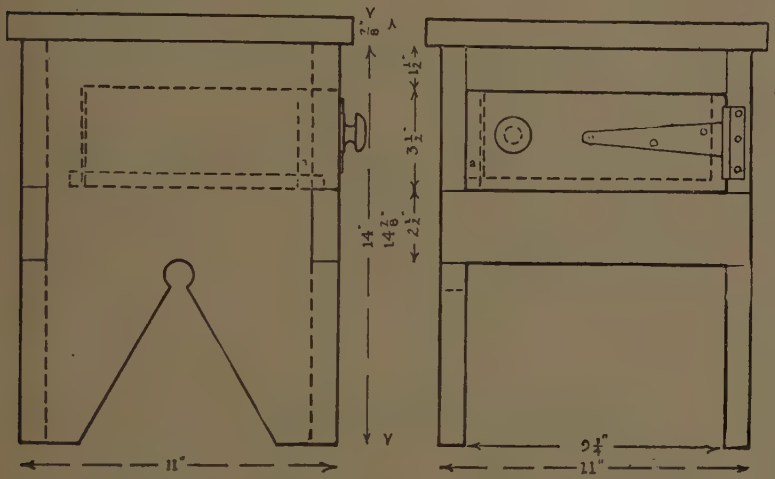






Blacking Stand ⅞" Stock except parts of drawer.

1 pc. 12" x 12"
2 pcs. 11" x 14"
1 pc. 7½" x 11" 1 T hinge (3")
1 pc. 1½" x 9¼" 1 pc. zinc or
1 pc. 3½" x 9¼" tin, 3½" x 14"
1 pc. 2½" x 11" 1 Knob.
1 pc. 9" x 9", 1 pc. 3" x 8½" (⅞")

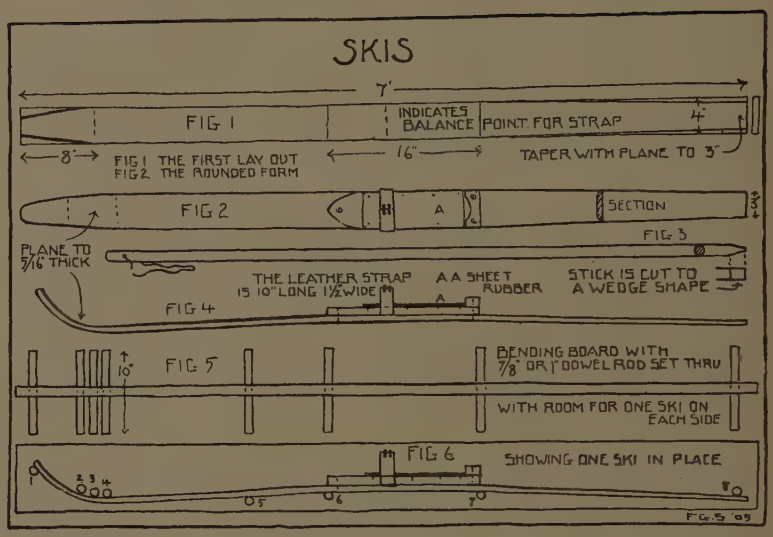


For this very useful BLACKING STAND the mill-bill is given on the diagram. Having got these materials together, cut out the sides first. You will see that the triangular space that separates the legs ends in a round opening. This hole is made with an auger, and it should be made first of all. You can choose your own height for this hole, but if you wish to get it exactly like that in the drawing, measure the distance from center of hole to floor and from top of side to bottom. Then do a problem in the rule of three, after this fashion: the length of the whole side in this drawing (about 2¼") is to the actual length of the real object (14") as the height of the hole in the drawing (⅞") is to the real height of the hole. Wherever in a mechanical drawing some dimensions are given and others omitted, this scheme may be followed.

There is in this particular case another way in which you could get at the dimensions. From a piece of stiff paper cut a little rule and mark off the 12" shown. Halve that distance for the 6", halve that again for the 3", again for the 1½", and from that you can work out your little inches.

The drawer is of a novel type, swinging out rather than pulling out. To get the curve for the drawer, use compasses or a pencil with a string tied to it. If you nailed the bottom right under the drawer-front it would show badly. For that reason you will want to cut a rabbet or channel in the front that will just receive the bottom, as you will see in the upper sectional view. Since the bottom is not to come all the way to the front, the quarter-circle that you draw must have its center not at the corner of the bottom but at the point where the hinge is to come. Before hanging the drawer, nail the stop *a* in place. Then assemble the parts, using nails or screws.

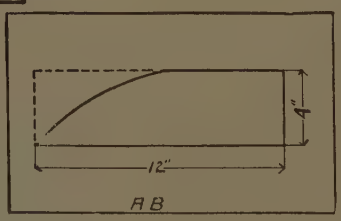
For those who live far enough north, where there are hillsides covered with snow during many wintry days, there is hardly an outdoor sport more exciting and full of fun than traveling on SKIS. Norwegian boys spend most of their winter holidays on these long wooden snowshoes, working up-hill and glissading down at breathless speed. They, and many others throughout the northern world, also make special slides with

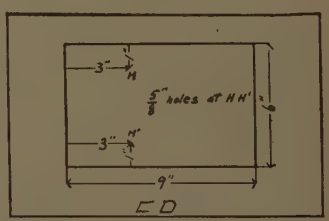


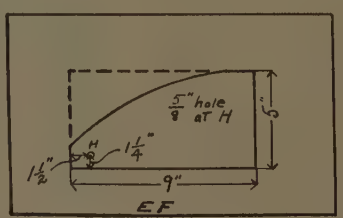
"thank-you-ma'ams" on them from which they take off for great leaps in the air. For pictures of skiing, see Volume VI.

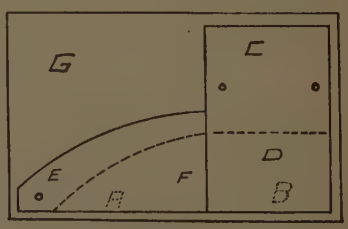
To make a pair of skis, get two pieces of ½" white ash, 4" by 7'. The wood should be straight grained, free from knots and checks. Saw and plane the wood in accordance with the diagram. Round the tips and the upper edges with rasp and sandpaper. Find the balancing point and locate the strap there. The foot block is of ⅞" pine. The straps should be of stout leather at least 1½" wide and 10" long. Cut a wide shallow groove on the under side of the foot block for the strap. With the strap in place screw down the hardwood heel blocks (shaped to the heel) and the foot block, filing off the screw-ends underneath. One screw runs through the strap. Lace the strap ends over your foot, to get the adjustment right.

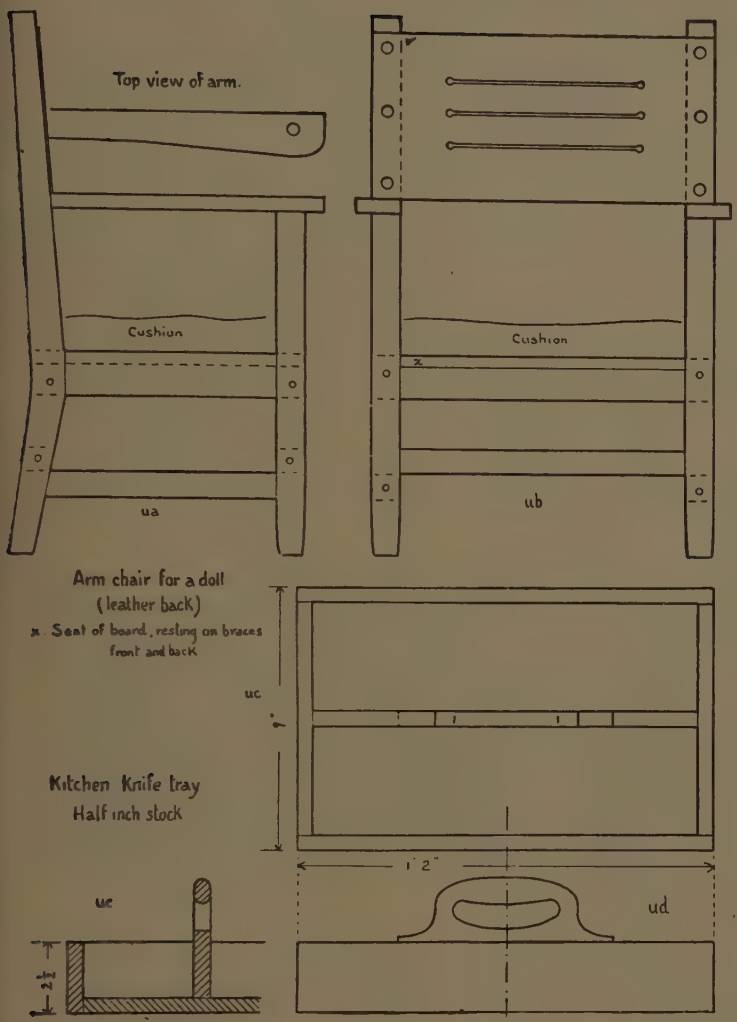
For the bending board choose a 1" board and on it draw a curve like the one in Fig. 6. Bore a set of holes according to Fig. 6, some on one side and some on the other of this curve; and insert eight lengths of dowel rod. Then fill a bath tub with steaming hot water and leave the skis in it over night, covered with a cloth. Next morning they may be set in the bending board and left till dry.











The ARMCHAIR given in this plan is good for doll or grown-up, so far as the proportions are concerned. If it is to be for the doll, the size here given is about right, and a tracing from the plan will furnish patterns for the cedar-wood or basswood parts. Here you have a chance to use your ratchet screw-driver and smallest drill, in order that you may use tooth-pick fastenings at the joints. Of course brads, the very smallest brads, may be used if that seems more convenient. For a cushion sew two pieces of silk remnants together along three sides; turn the bag inside out; fill with two layers of cotton batting or absorbent cotton; and sew up the third side. The back is of leather. If you have a friend in the book-binding business he can get you sample pieces of leather that will exactly suit your purpose. For such very tiny furniture it is hard to find small brass-headed nails. Large common pins can be cut off and tacked in instead. Don't stop short at a tiny miniature chair, but find a doll in the house that needs a chair and make her one. To get the correct measurements, bend the doll's leg and measure from heel to leg. Subtract one-tenth from this and you will have the height of the chair from floor to top of seat. All the other measurements may be found by the rule of three, as explained before.

No boy who has made such a chair for sister's doll will ever stop there satisfied. The next step should be a larger one for Baby, built on the same lines. Then he will have little trouble in putting together one large enough for Father. Be sure he will sit in no other.

A very practical article is the KITCHEN TRAY here drawn. Remember in making it that it is to withstand hard usage; and so make every joint solid. Here is just the place to take extra time for boring out holes and using small brass screws. Start the ends of the grip-slot with a bit. If the tray be made of clear-grained basswood that is well dried and not likely to split, and if it is sawed and planed "true" and put together with screws, it will last and last and, as the old phrase has it, "keep you in good remembrance." The only thing needed to make the tray perfect is two or three coats of boiled linseed oil, each one being allowed to dry three days before the next is applied. Linseed oil has a pleasant golden color, and it is about the best of water-proof coatings.

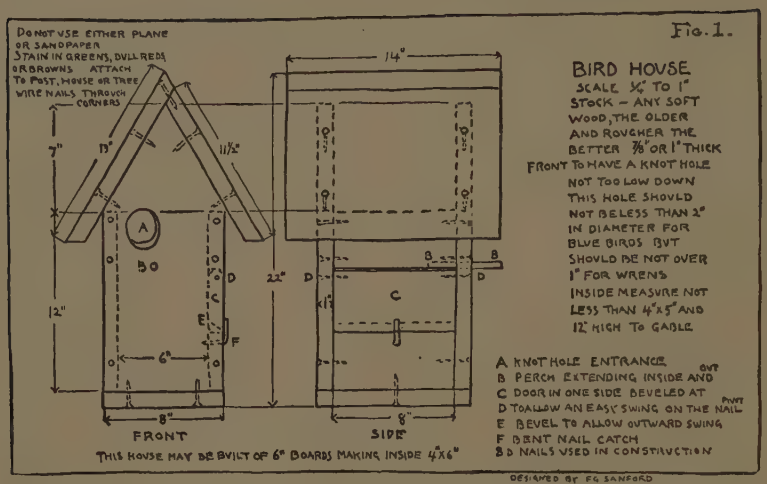
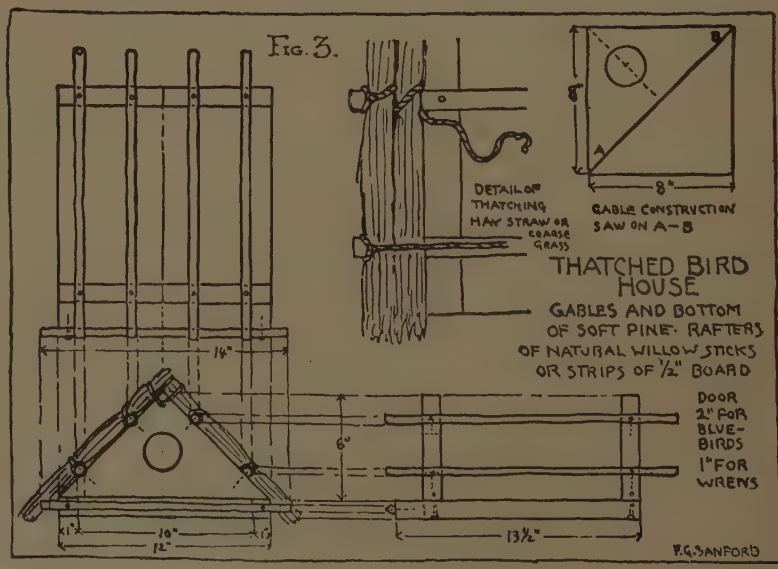
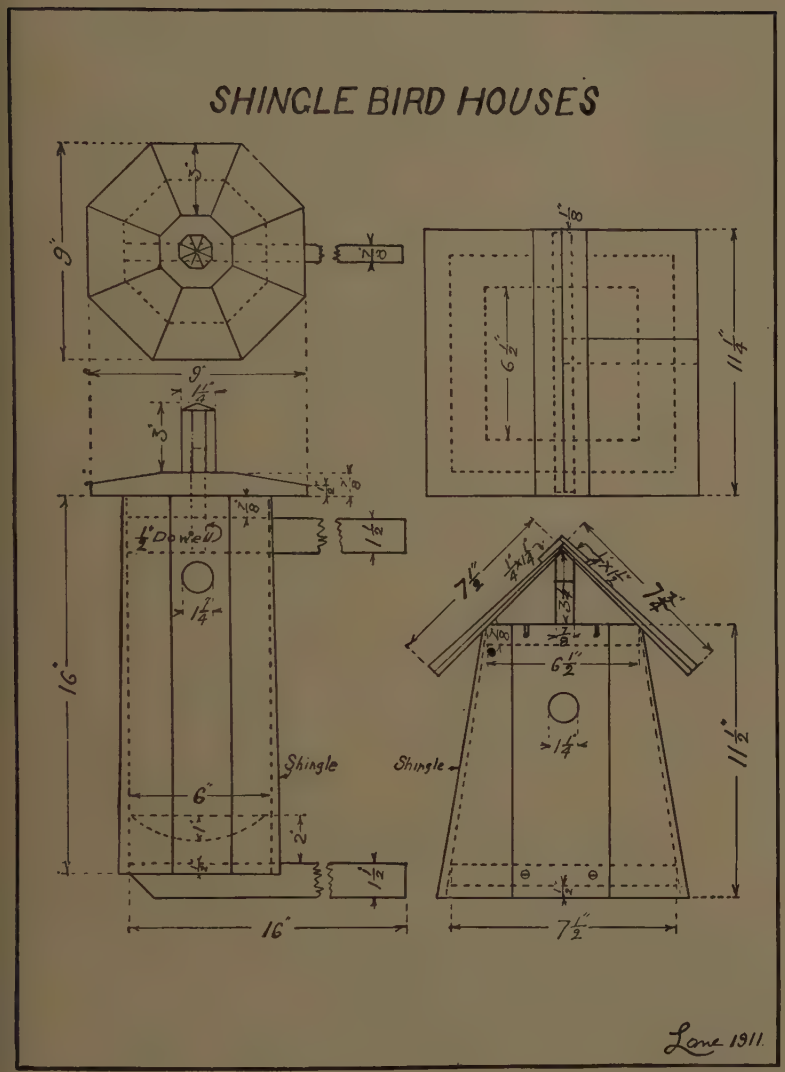


Fig. 1.
BIRD HOUSE
SCALE ½" TO 1"
STOCK – ANY SOFT WOOD, THE OLDER AND ROUGHER THE BETTER ⅜" OR 1" THICK
FRONT TO HAVE A KNOT HOLE NOT TOO LOW DOWN THIS HOLE SHOULD NOT BE LESS THAN 2" IN DIAMETER FOR BLUE BIRDS BUT SHOULD BE NOT OVER 1" FOR WRENS
INSIDE MEASURE NOT LESS THAN 4"x5" AND 12" HIGH TO GABLE
DO NOT USE EITHER PLANE OR SANDPAPER
STAIN IN GREENS, DULL REDS OR BROWNS ATTACH TO POST, HOUSE OR TREE WITH NAILS THROUGH CORNERS
A KNOT HOLE ENTRANCE
B PERCH EXTENDING INSIDE AND OUT
C DOOR IN ONE SIDE BEVELED AT
D TO ALLOW AN EASY SWING ON THE NAIL PAST
E BEVEL TO ALLOW OUTWARD SWING
F BENT NAIL CATCH
B D NAILS USED IN CONSTRUCTION
14"
7"
11½"
12"
8"
22"
6"
FRONT
SIDE
THIS HOUSE MAY BE BUILT OF 6" BOARDS MAKING INSIDE 4"x6"
DESIGNED BY F.G. SANFORD

When you hear that the insects have within the last year ruined crops to the extent of millions and millions of dollars, you ought to make up your mind to help in the crusade against the bug by being hospitable to the birds, the great enemies of insect pests. Read and study carefully the plans and directions given on this page and you will be ready to fit out your trees (and perhaps some of the neighbors') with homes for wren and bluebird and the rest of the smaller birds that need security from marauding hawks and blue-jays. The reason for leaving these houses rough and unpainted is that birds have an inborn suspicion of artificial-looking things. Photographers often get close to birds simply by holding a limb of brushy foliage in front of them as they walk, to hide their camera and clothing.

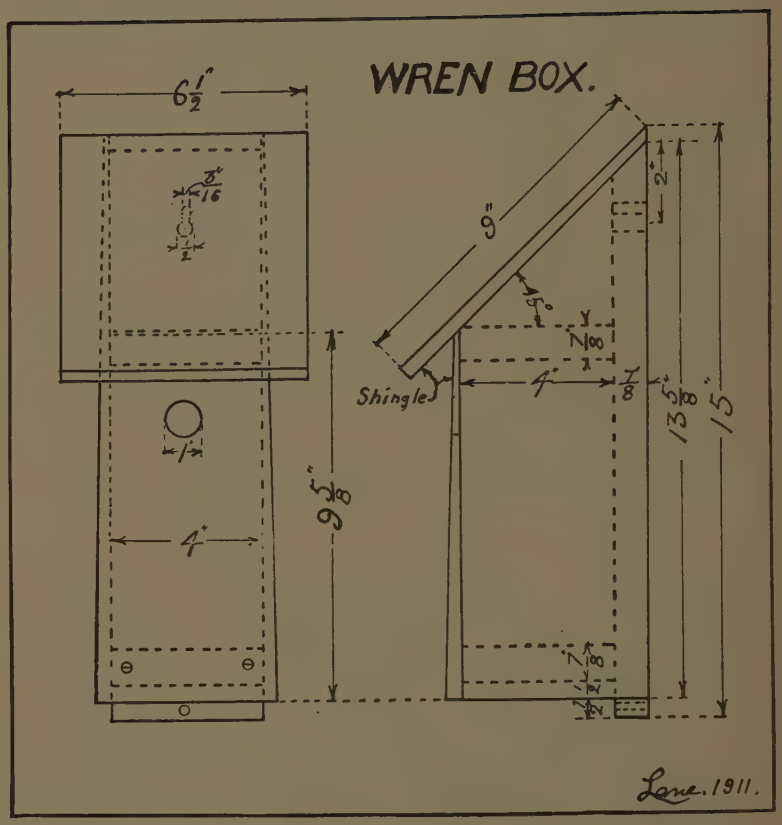
Every bird house you build shows you to be a friend of a hunted race.





March is the month in which to provide quarters for the birds, who might truly be said to be a conservation army. A conservation army is needed because man has "destroyed the balance of nature." Did you ever hear anyone say that, and wonder what it meant? Nature is said to be balanced when it is impossible for any one sort of animal to overrun the earth. Insects are eaten by small birds, small birds are eaten by large birds of prey, large birds are eaten by snakes and the smaller animals, small animals are eaten by large animals, and large animals eat each other — as that fierce prowling fellow the wolverine — or drive each other off from the feeding grounds. Now man has stepped in and cleared away enormous areas of forests that used to be the protecting home of countless small birds; and he has turned loose among these birds the English sparrow and the house cat. At the same time he has provided the insects with more than their share of sunny open spaces such as they thrive in, and with tender young vegetables. So without meaning to, man has discouraged birds and encouraged insects, and the balance is destroyed. And now he has to arm himself with poison and spraying apparatus and himself do the work that was formerly done by the birds. The birds are being more and more protected, however; and while we may not do as much as did the woman of great wealth who recently purchased a large island down in Louisiana and established a guard there so that our northern birds may have a safe place for their winter stay, still we may do our small and helpful share as bird-friends. Try and discourage your friend who shoots birds and squirrels.

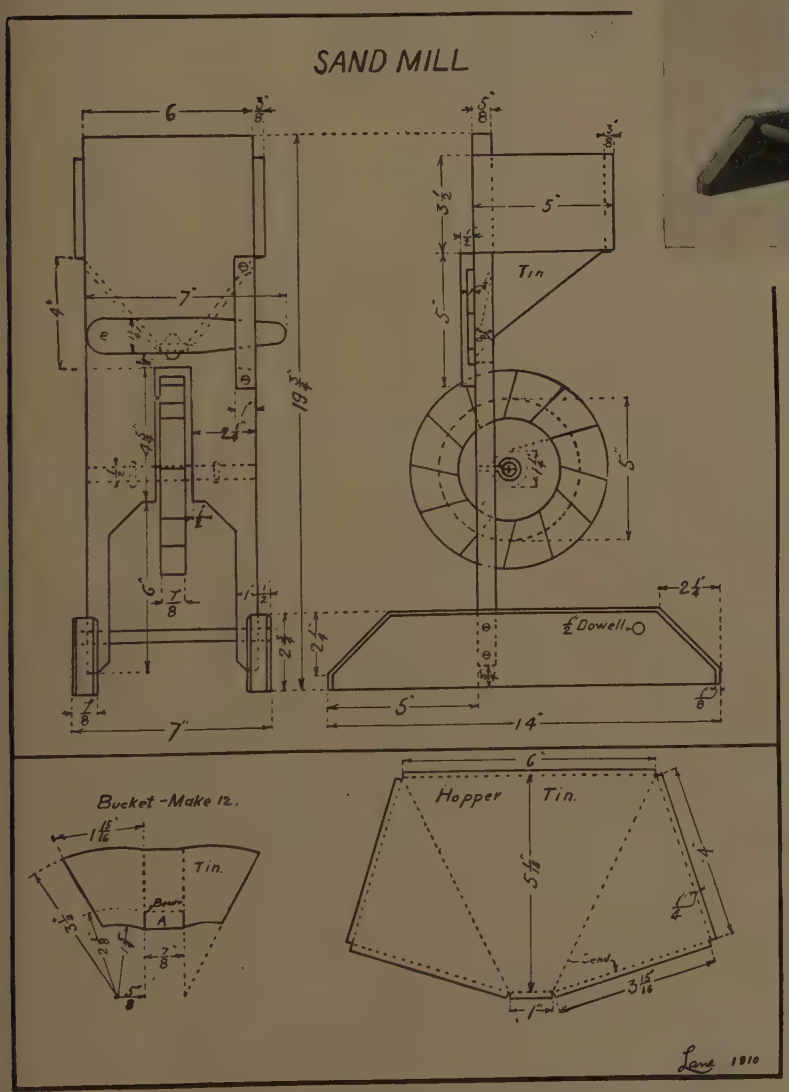
To make the octagonal house, saw out the octagonal 2″ board for the bottom; and the ⅞″ boards for the roof, the piece underneath the roof, and braces to hold the house to the tree. Bevel the roof and bore a ½″ hole in its center down through the other pieces. Gouge out the hollow in the floor. Then put on the shingles, nailing on every other shingle (with three-penny nails), planing the edges to receive the remaining shingles, nailing on these last, and planing the edges down.



The WREN BOX shown here in plan and picture is made in the following way: Get out the back ⅞″ × 4″ × 15″, and the top and bottom ⅞″ × 4″ × 4″; bevel the top of the back at 45°. Bore a ½″ hole 2″ from the top of the back and a 3⁄16″ hole ¾″ above it and saw out between to form a hanger; bore a 3⁄16″ hole near the bottom for another nail or screw. Nail the back to the top and bottom, one 4″ from the bevel and the other 1″ from the lower end. Taper the sides of the front, bore a 1″ hole near the top, fit carefully under the roof, and fasten the bottom with screws or screw-eyes.

A good stain for shingles is made by thinning colors ground in oil with kerosene. The house should be put up with the opening away from the prevailing winds. At the upper left hand is shown a "Tower" house for martins, made from a coffee keg and thatch over tapered barrel staves.

Just as in olden times they had water clocks and sand clocks (hour-glasses), so it is possible to make water wheels and sand wheels. In the SAND MILL illustrated on this page the sand is contained in a box made of basswood, some of it $\frac{3}{8}$" and some $\frac{5}{8}$". The place for the wheel in the lower part of the upright may be laid out with the square and gauge and cut with the rip-saw and chisel. The $\frac{5}{8}$" hole for the sand should be bored at an angle of 45° and the sides and upper edge beveled on the inside. The wheel should be perfectly round and true. Lay out the places for the twelve buckets on the

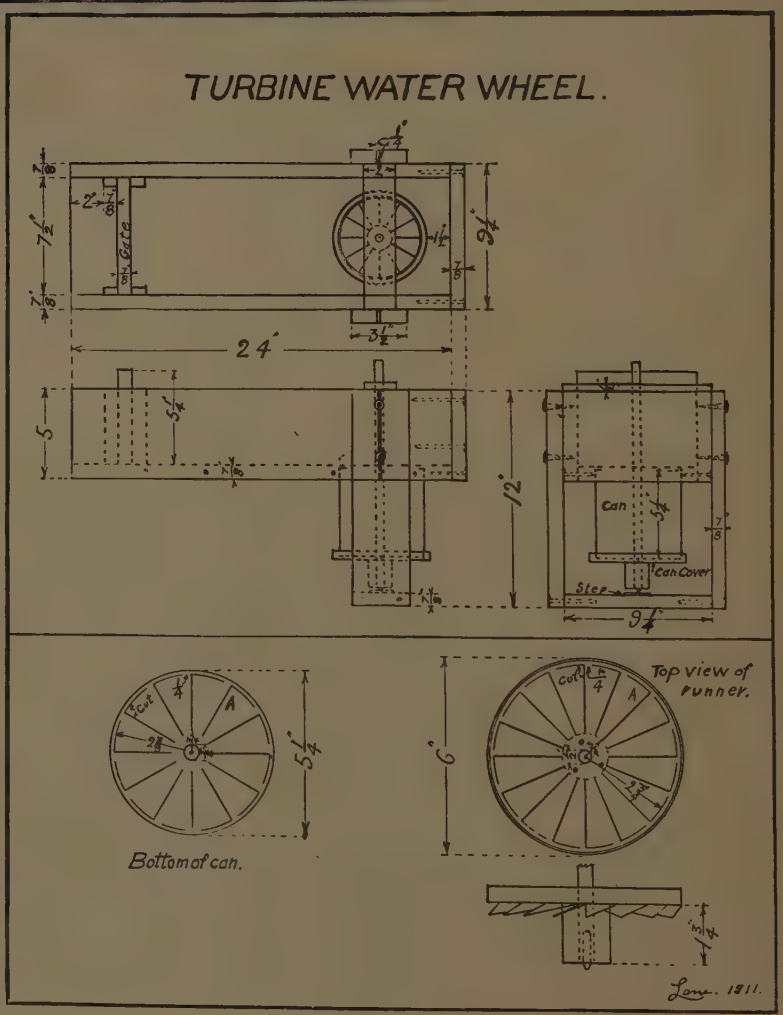


circumference, draw circles $\frac{5}{8}$" and $2\frac{1}{8}$" from the center, and lines from the points on the circumference tangent to the smaller circle. With the back-saw saw down on these lines to the larger circle. Having made twelve buckets according to the pattern from old tin from cans, place all the buckets in the saw cuts, and fasten them in place with four-ounce tacks. Bend the tin hopper on the dotted lines, and fit it perfectly. The upright and the gate are held in place by small screws. The shaft is $\frac{1}{2}$" dowel rod, and the bearings are screw-eyes. The sand should be caught in a movable box after it spills from the wheel. A tin biscuit box will do.

the floor of the flume and tacked there. The gate should fit loosely, and the upper end of the flume may be covered with coarse wire netting to keep out sticks and leaves. To the top of the shaft may be attached a spool or gears from an egg-beater.

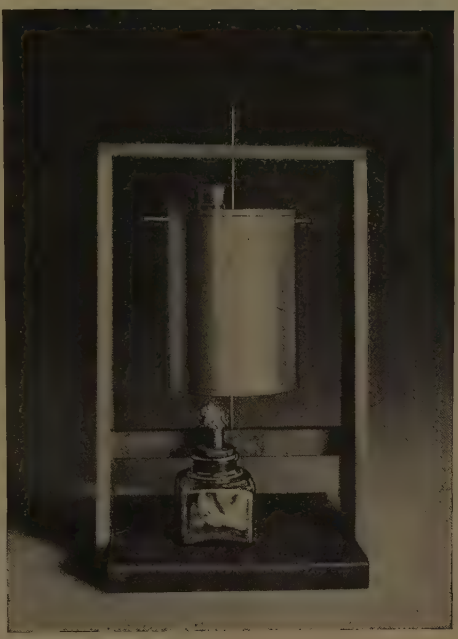
This toy represents a type of power that is displacing the regular steam engine on battleships.

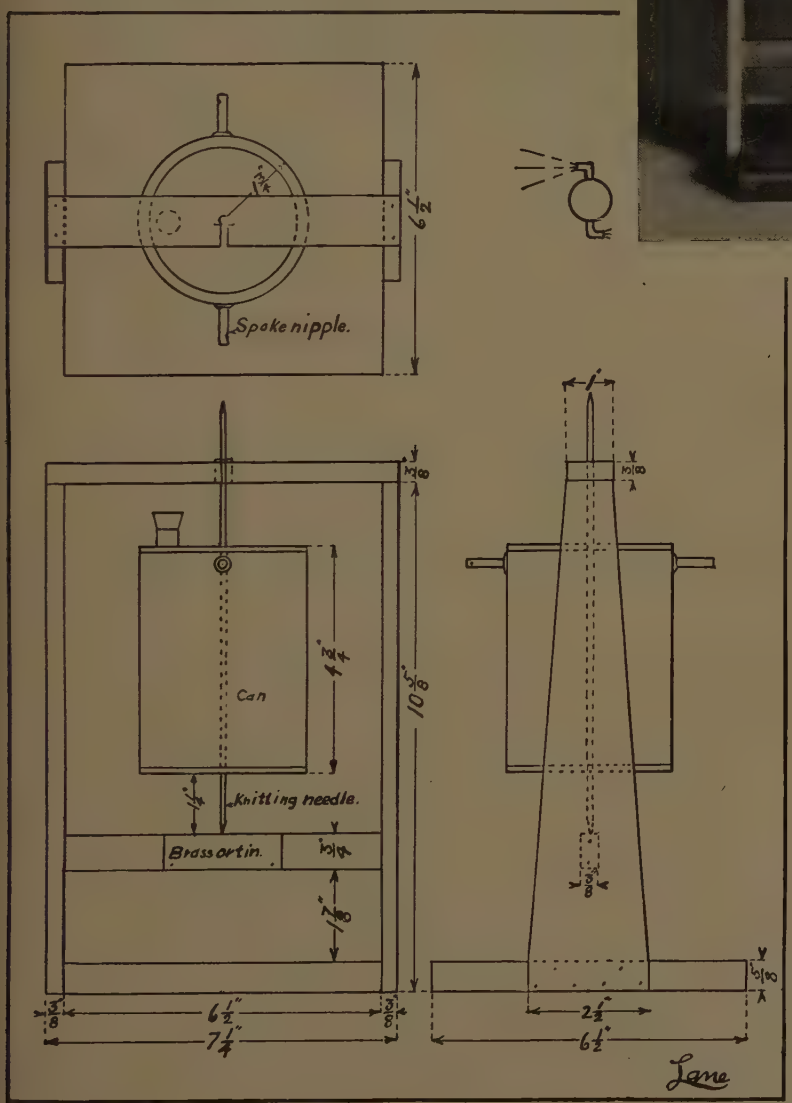
Reduced to its simplest terms, this TURBINE WHEEL is a scheme for pouring water through a set of slanting openings in a tin-can cover set upon a vertical pivot. To give the down-pouring water the greatest possible force, a can a trifle smaller than the cover is set just above it, being fastened to the wooden box or flume that leads the water along from above the dam. When the runner has been cut and bent as in the diagram, tack it to a spool, and run down through it the $\frac{1}{2}''$ dowel shaft. Into the shaft set a nail-end that is to rest in a dent in a small piece of brass or hoop iron. The cross-piece on which the runner rests is held to the sluice box by side-pieces that are slotted at the top so that they may be moved up or down when the screw and washer fastenings are loosened. The can is fitted tight into



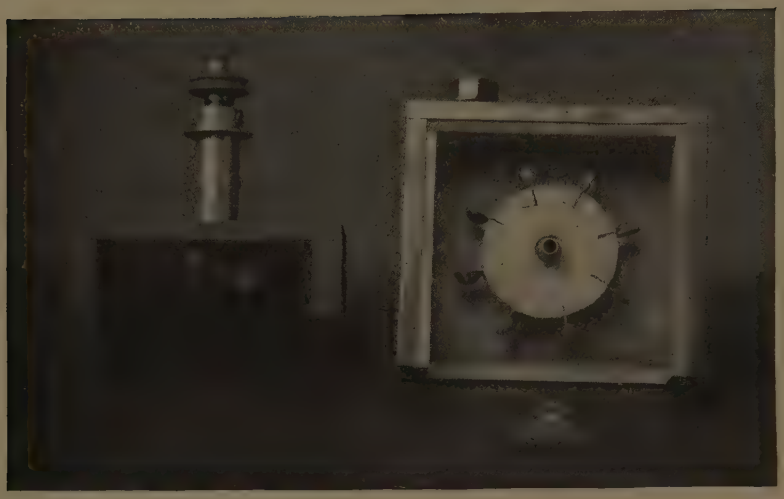
HERO'S ENGINE

To make the lamp for this primitive Greek STEAM-ENGINE, insert in the cork of an ink bottle an empty cartridge shell with the end filed off. Cut a slight notch down along the outside of the cork for the admission of air, and supply a string wick. On opposite sides of the tin-can boiler, spoke-nipples with the ends filed flat are to be fastened by means of a cheap soldering outfit. Run fine brads through the nipples and punch through the can. Close the nipple-ends with solder, and in opposite sides file notches almost through, as in the diagram, completing the holes with a brad. On the top



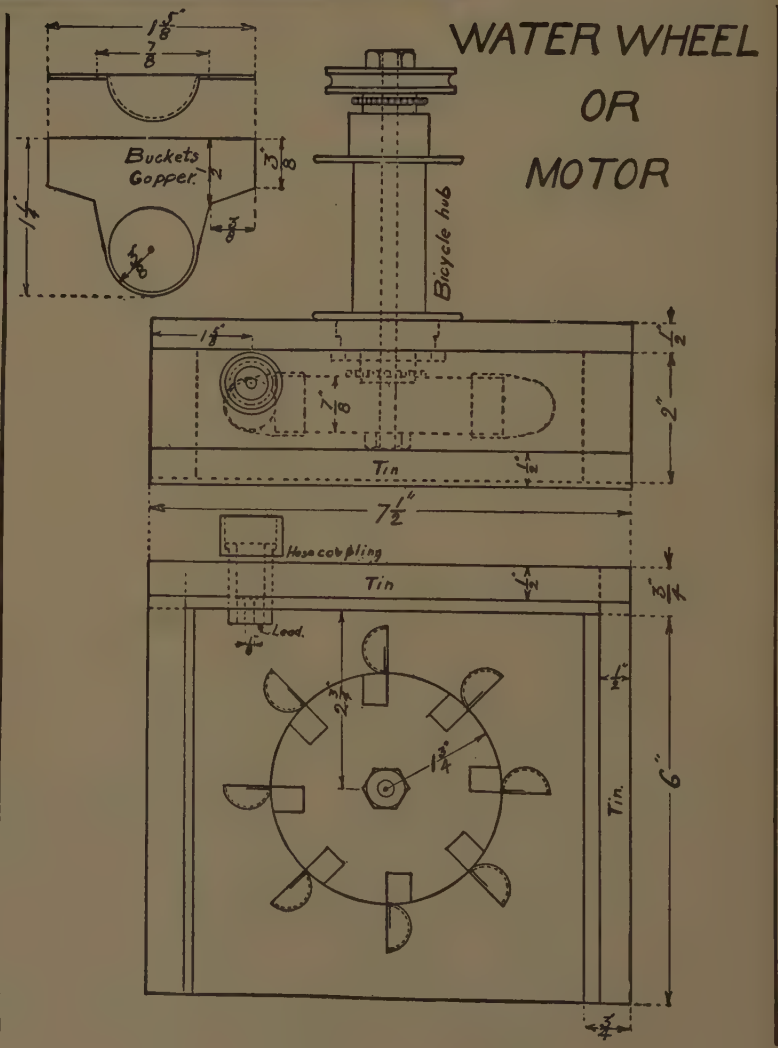


of the can solder a section of cartridge, head down. Punch a hole through cartridge head and tin, and supply a tight-fitting cork. Through the precise center of top and bottom punch holes just large enough to admit the knitting-needle pivot, which should be well soldered in place. Build the frame in accordance with the diagram. Tack sheets of brass or tin over the cross-pieces, with a dent in the lower and a hole in the upper for the pivot. To operate, fill the boiler ⅓ full of water, and the lamp with alcohol. The steam that will rush through the nipple-vents will set the can whirling. When disposed to brag of our inventions, read history.

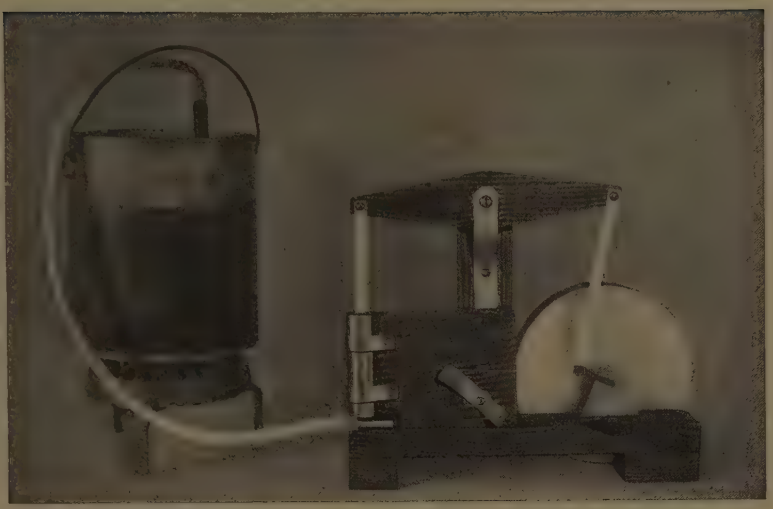


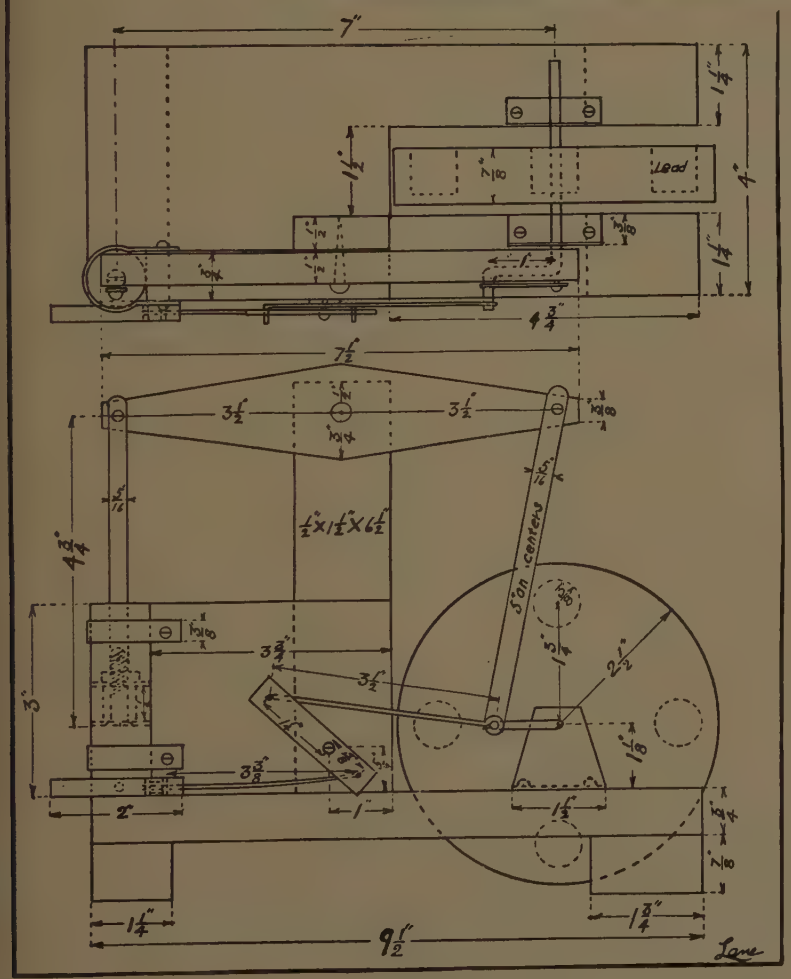
through. Set the coupling in place in the top of the box, causing the water to play upon the edge, not the center, of the cups. Fasten a pane of glass over remaining side with overlapping strips of tin. This represents a type of water power which is used to drive powerful mining machinery in the west.

A WATER-MOTOR to be attached to the kitchen faucet may be made according to these plans, a hose coupling and an old bicycle hub being the only parts at all hard to procure. Make the box by nailing the top to the ends and then screwing the single side to top and ends. In this side set one end of the hub, the sprocket having been removed. To the outer end attach a wooden pulley-wheel and to the other end the motor wheel. This is to be sawed out from $\frac{7}{8}$" wood, and upon it are to be fastened the eight spoon buckets. Make these buckets of copper that has been heated dull red and allowed to cool slowly and thus become soft. Set the flat copper patterns over a $\frac{3}{4}$" hole in a hardwood block and shape the cup by pounding it with the rounded end of a $\frac{5}{8}$" rod. Plug the lower end of the hose coupling with lead and bore a $\frac{1}{8}$" hole



Make the cylinder of this WALKING-BEAM ENGINE out of an old bicycle pump, sawed off 3″ from the far end, which has been plugged tight. From the pump plunger cut off a 2″ piece, and in it drill a 1/8″ hole, and a 1/8″ hole likewise near the bottom of the cylinder. Solder these parts together, holes meeting. The piston is a 1/4″ bolt 1 1/4″ long, split with a hacksaw at one end to receive the 20-gauge strip-brass connecting rod, this being held in place by a pin in a hole bored through bolt and rod. Put two 3/4″ washers on the bolt, with a piece of 1/2″ dowel between them, the dowel bored through with a 1/4″ hole, and bound with string "packing." On the end of a bicycle spoke screw two spoke-nipple ends, one reversed, and bind thread packing between. The fly-wheel is of wood weighted with a filling of melted lead in four 3/4″ holes. The other parts of the engine are of sheet brass and wire and whitewood cut out and put together according to the diagram. The boiler is a can with a small tube soldered in. On page 52 are directions for heating the water.





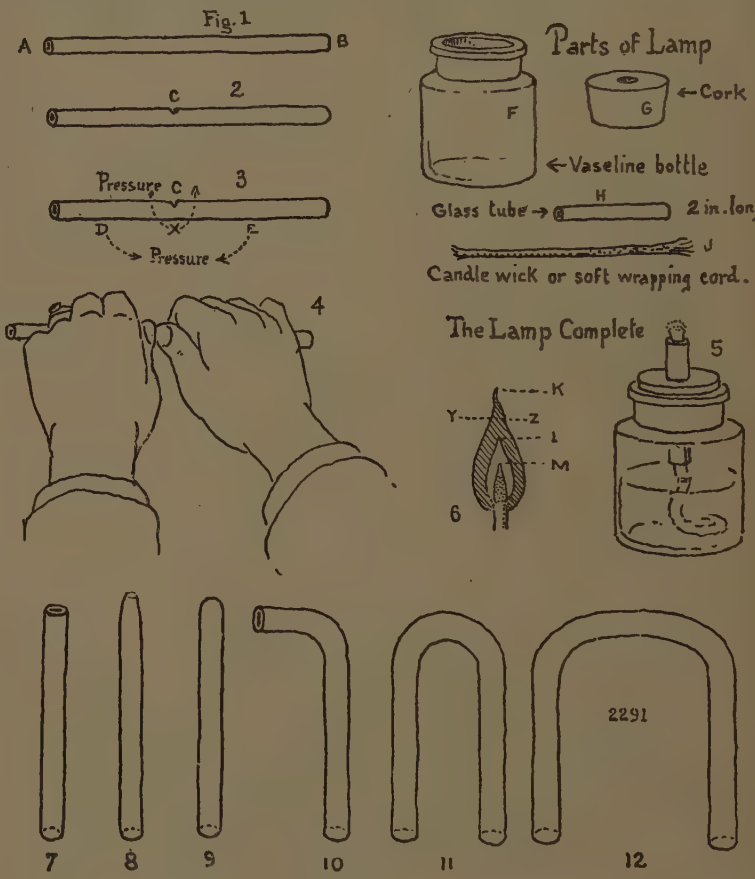
Here is an ENGINE that a boy built of what might be called "junk." The cylinder was part of an air-gun, the guide and crosshead part of a curtain fixture; the fly-wheel came from a barn door, the hangers, shaft, and bearings from a sewing machine. With ingenuity you can build yourself model engines of many sorts.

An ALCOHOL LAMP that will do for heating the water in your engine boiler may be made of the simplest materials. Study the plate on this page and from it make out a list of the materials you are to gather, —you should have a small three-cornered file, a round file a little less than one quarter of an inch at its largest diameter, and some soft, flint-glass tubing with good thick walls and an outside diameter of a quarter-inch.

To cut the tubing, pass the three-cornered file two or three times across it at the appropriate point in such a way as to make a slight scratch or nick. Then exert pressure upon the tube as shown in Figs. 3 and 4 of the diagram.

To bore a hole in the cork, punch into the center of the cork with the sharp point of the round file. Then insert the round narrow end of the file and turn it towards the right until it has passed through the cork, pushing out all of the cork borings. Soak the cork in warm water to soften it before fitting the glass tubing.

The wick may be of the kind sold for the purpose, or it may be of soft cotton wrapping cord. Fill the lamp half full of wood alcohol or of denatured alcohol. To light, dip the tip of the wick in alcohol and wipe the lamp dry. We all like to see the little manufactured engines that are in the toy shop windows. But these are rather expensive, and not half the fun of those we make ourselves. If you have an engineer friend, one who has charge of a factory engine, it will be to your advantage to see the engine started and stopped.



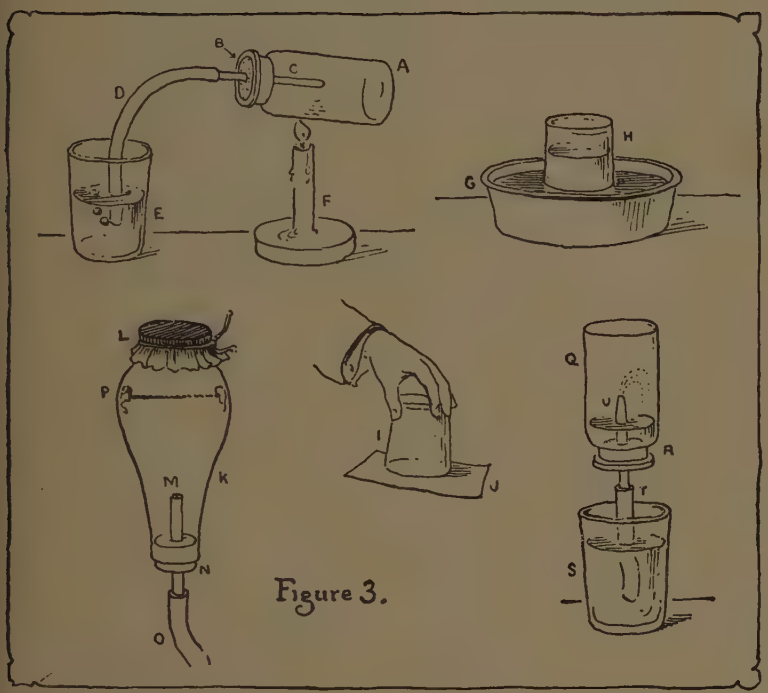


Figure 3.

With such a lamp as that described on the last page, and with glass tubing and certain other easily obtainable materials, it is possible to carry out several SIMPLE HOME EXPERIMENTS which illustrate the laws of air pressure.

Tubing, by the way, should be heated by being held over the flame at the point Y–Z (see diagram, page 52).

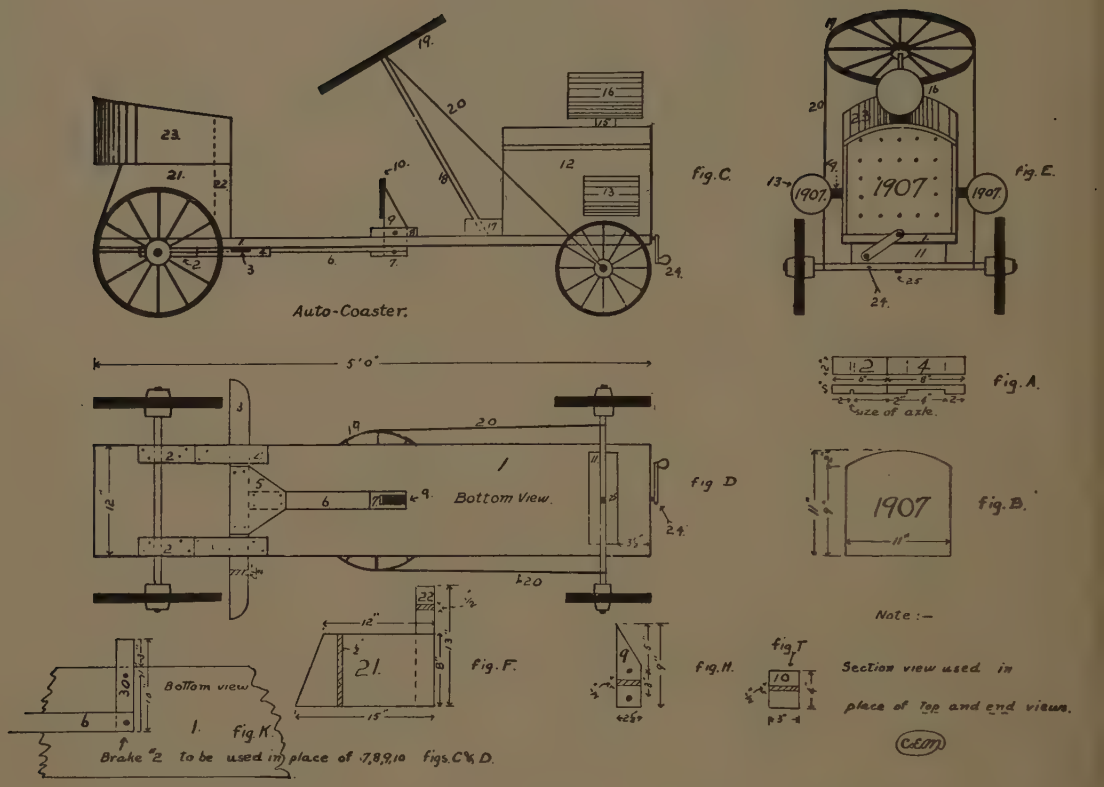
To round the sharp edges of a broken tube, hold the end in the flame and keep the tube slowly turning. Stop when the glass has come just to the melting point. If you continue to hold it in the flame, the end will gradually melt together, and you can thus get a jet or spray end, as in Fig. 8.

A still further continuation would close the end altogether. To bend the tubing as in Figs. 10, 11, and 12, heat it where the bend is desired and also for a half-inch or inch on either side. The object is to have the heat graded, to prevent a too great sharpness in the bending, which would throw the tube out of shape and almost close it. So keep the tube moving left and right through the flame, and bend just a little at a time.

To show that air exists, although it cannot be seen, construct a bottle like A, with a length of glass tubing set in a hole in the cork, and a rubber tube fitted over the glass one. When the bottle is heated by being held over the flame of a candle, or better, of an alcohol lamp, the air within will expand and bubble up through the water in the glass. (Keep the bottle *over* the flame, not *in* it.)

The downward pressure of the atmosphere is shown by a glass, H, set on its side in the bottom of a pan and turned upside down without the edge being allowed to come above the surface. It is the pressure of the air on the water that holds the column of water up in the glass. That air presses upward as well as downward is shown when a tumbler is inverted with a paper over the mouth. Nothing but upward pressure holds the water in. That air presses equally in all directions may be proved by covering one end of a lamp-chimney with a sheet of thin rubber (your dentist will sell you a piece) and corking the other end with a cork having a glass tube in it, and a rubber tube attached to the glass one. Through the rubber tube draw out enough air to pull the rubber in almost to the indicator string, P, that you have fastened in with wax about 2″ from the end. Really the rubber is not *pulled* in but *pushed* in by outside pressure; and this outside pressure must be the same in all directions since you can turn the chimney all about without any change in the rubber.

If a bottle be prepared as in Q, with the tube in the cork melted to a fine spray-end, and if air be drawn from the bottle and the tube pinched and then released with the end under water, the greater pressure from the outside will force the water in a small fountain up into the bottle. See how nearly you can fill it in this way. Simple experiments like these are especially valuable to those who expect soon to enter the high school and study chemistry.



Here is an AUTO-COASTER that will give you almost as much fun in summer as a bob-sled or double-runner will in winter.

The first thing to do is to find a pair of stout wheels. These are to be fitted to the 12″ × 5′ bottom board of one-inch planking. The board must be raised sufficiently from the front axle, by means of a "riser" block, to be level, the front axle being lower than the rear. This "riser" carries the king-bolt or pivot of the front pair. To the under side of the bottom board and four inches from the end screw two strips 1″ × 2″ × 6″, with a groove cut to receive the axle. Extending beyond these strips fasten two brake-straps, 1″ × 2″ × 8″, each provided with a groove ½″ by 2″ by 4″ to admit the brakes (see 4 in Figs. A and D). Two and 4 in the Figs. A and D may be made in one piece; but remember that the measurements here given are for 14″ wheels, so that a change in the length of the strap and the location of the groove would have to be made if your wheels were of a different size. When "off," the brake should rest one inch from the wheels.

The hood is made of a box 12″ × 12″ × 16″. The boards are to be removed carefully and replaced when the box-ends have been shaped as seen in Fig. B. Before putting the last board on again reach in and bolt the search-light on. The search-light is a 2 qt. can. Through it and through the pivot-block (1″ × 2″ × 2″) and the top board of the hood bore a hole for the bolt, which should be set just tight enough to allow the light to turn. The side lamps are to be bolted in place in a similar way. Use cans with slip tops that may be replaced after the bolting has been done. Measurements for the seat can be taken from the diagram. The rounding top is made of a cheese box with the front cut and straightened out, and the sides tapered. Two sorts of brakes are possible, but the foot-brake is to be preferred. Paint the car red, and don't forget the tail-number. If you wish, you can fix your dark-lantern within the search-light can.

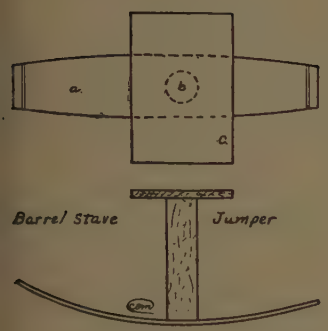
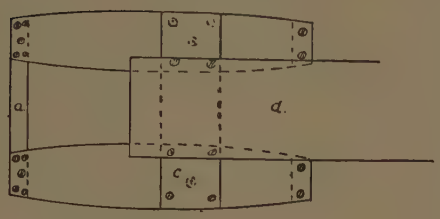
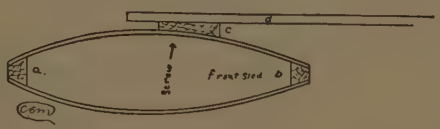


Fig. 1



Bouncing Bob. Fig. 2



When you want a little variety, from skates and skis and ordinary sleds, try one of these BARREL-STAVE JUMPERS and have the upright a foot long and the seat about 8″ by 16″. The construction of the jumper is extremely easy; but to slide down hill on one without an occasional hilarious tumble is not nearly so easy.

Out of more staves of the same sort may be made a bob-sled that will travel better than the average bob on soft snow, while on a crust it is very fast and springy. The method of construction is made plain by the diagram. In fastening the parts together remember to set the wide cross-piece a little back of the center, so that the points of the runners will be tilted slightly upward by the weight of the passengers; and remember to use screws (1¼″ No. 10 flat-head wood screws) instead of nails. Bore countersunk holes for the screws in the top one of any two pieces you are fastening together.

A SWING-CHAIR for a small child may be made of pieces of ½″ or ⅞″ board cut out in six parts of the shapes and dimensions given in the right-hand diagram. These pieces are to be strung upon clothesline and held apart by 3½″ and 4½″ lengths of an old bamboo fishing rod, cut between joints. To put the seat together, take two lengths of clothesline, each 6 yards long, double each one and loop it through a hammock ring; these are to hang it by. Take the right-hand one: pass it through a^2, a^1, a 4½″ length of cane, and through a, knotting it under the seat. Pass its other end through b^3, a 3½″ cane, b^2, b^1, a 3½″ cane, b, and knot it. The other side is done the same way. Also a short piece of line runs through the three rear holes, c. The front, thus threaded on, slides up to allow the youngster to be set in, and slides back to hold him in.

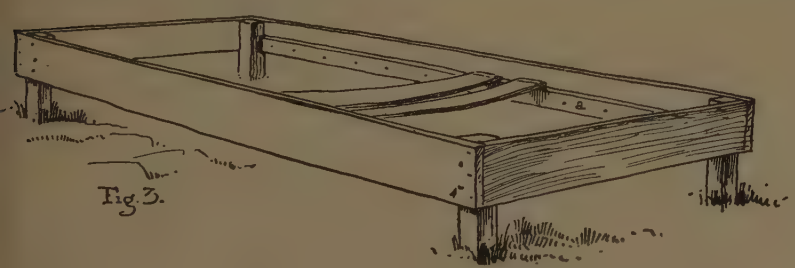
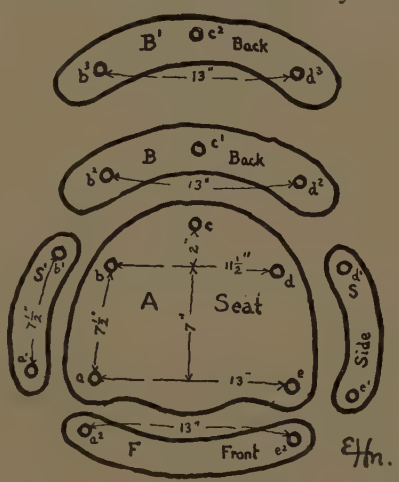
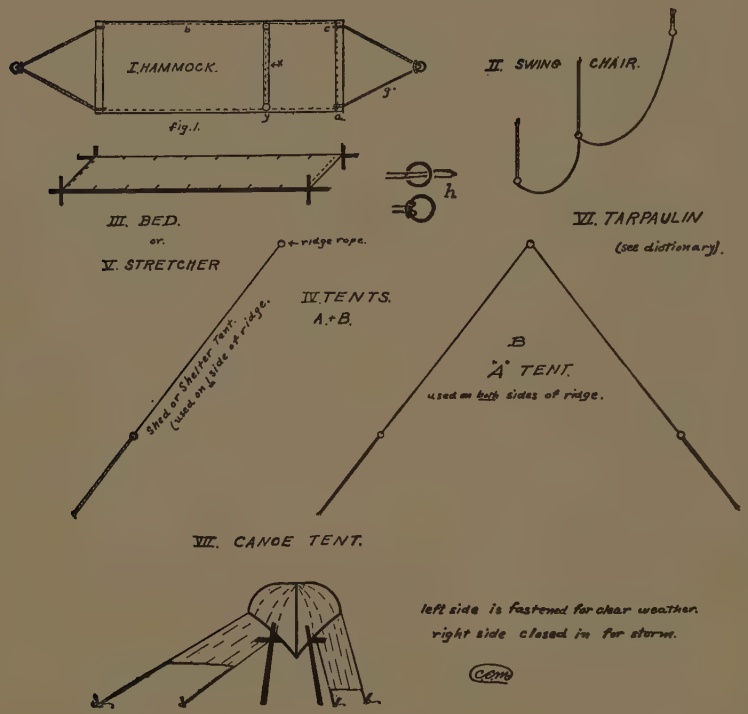


Fig. 3.



Here is a way to make a BARREL-STAVE BED for use in a permanent camp. There it is very needful that the bed be not rigid, and when you turn in your sleep the springs are welcome. If it is true that Nature wastes nothing, it is a pretty good plan to follow with whatever we make from her materials. And surely the barrel serves many successive uses.



Here are diagrams and specifications for a CANOE-CAMPING OUTFIT. The hammock is an 8′ 6″ length of yard-wide canvas with 1″ hems stitched (with a sewing machine) along the sides, and 2½″ hems on the ends. Thread clothesline through the side hems, bringing the ends out through holes in the canvas and sewing them in loops around the broom-handle stretchers that have been run through the end hems. To these stretchers fasten clew ropes that are tied to hammock-rings by the hitch shown at *h*. With two additional ropes for tying to trees, the hammock is complete. The hammock may be used as a swing chair if a strap of canvas be sewn across as in Fig. 1, with a guy-ring made securely in at each end. Or the hammock may be made into a cot by means of end posts to which its corners are tied, and which are kept apart lengthwise by poles cut to suit, and lashed to the posts. At night, when the dew is likely to be heavy or rain threatens, the hammocks will serve as a tent, in connection with the canoe.

To use the hammock as a tent, preparations must be made in advance by fastening into the inside of the canoe gunwales nine brass screw-eyes (½″ eye), the middle one of each nine being in the center of the gunwale, and the others spaced a foot apart. You should then make holes in the side of your hammock that will just fit over these screw-eyes; and you will need a rope long enough to pass through the nine from end to end to hold the canvas on. As two of you will naturally be traveling together, there will be a tent flap for each side of the canoe, the canoe being inverted as in the picture, and supported at the ends by lashed poles. If the canoe is slanted head-down into the storm, and if drainage ditches are dug around the outside to carry off the rain, the tent thus put together

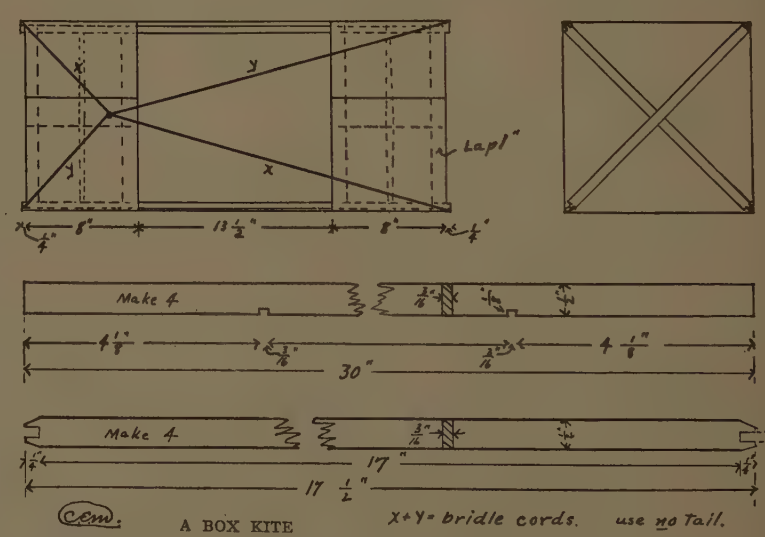


Fig. 1

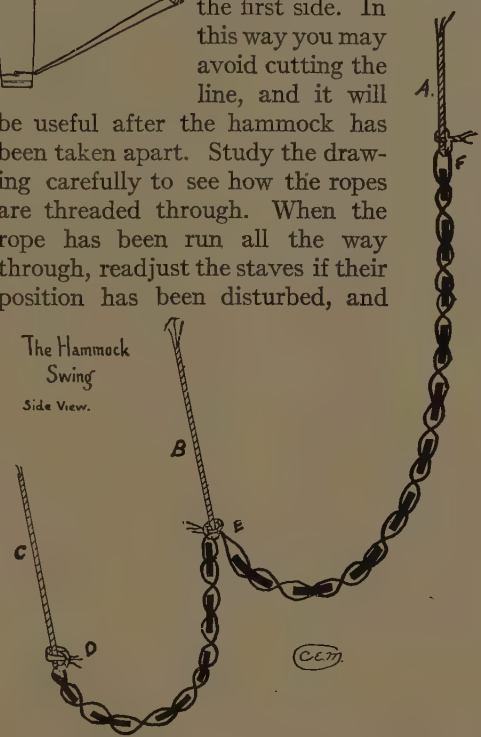
will be protection against any summer spells of bad weather.

For your canvas, a 12 oz. duck will be heavy enough for strength, though one somewhat heavier will give you better and more comfortable service. Every pound counts on the tramp and portage.

A BOX KITE. Page 56. Make 4 pieces 3/16″ × ½″ × 17½″ for the diagonal spreaders. Use 2 pieces of cloth or very strong paper 10″ × 4′ 3″. Plenty of strong cord. Cut notches in the long pieces 4½″ from ends, also in ends of short pieces. The short pieces or spreaders are notched in the center but rest on each other, making a strong spring to keep the corner posts in position. The kite needs no tail; remove the diagonal spreaders and it may be rolled up in a very small package.

If you have never made and used a BARREL-STAVE HAMMOCK, you cannot realize what a simple and comfortable bit of furniture it is. The staves from a single clean sugar or flour barrel should be secured and cleaned and the ends of them rounded slightly.

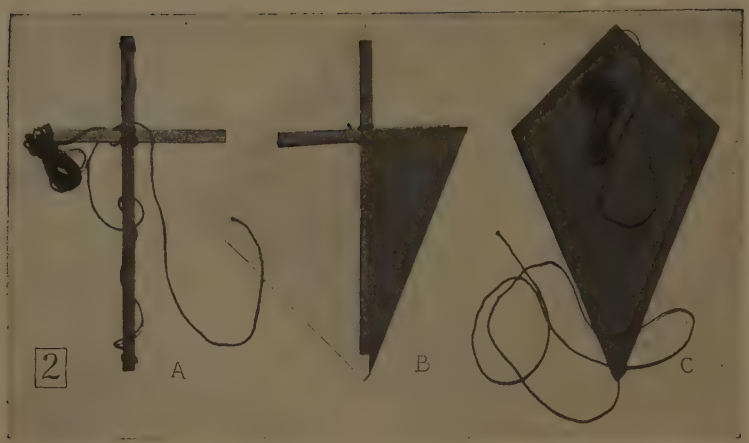
Bore a 1″ hole in the end of each one, setting the center of the bit 1½″ from the groove that received the barrel head. Smooth off the edges of the holes and also the edges of the staves, that they may not chafe off the lacing ropes. To "thread" the hammock, arrange the slats side by side on the ground, one inch apart in the middle, and drive a couple of stakes into the ground beyond the middle of the end slats. Then commence your threading with a forty-foot piece of manila clothesline. Tie one end temporarily around one of the stakes, and then run the whole line down one side, around the other stake up the other side, around the first stake, back along the second side, around the second stake again and up the first side. In this way you may avoid cutting the line, and it will be useful after the hammock has been taken apart. Study the drawing carefully to see how the ropes are threaded through. When the rope has been run all the way through, readjust the staves if their position has been disturbed, and



then fasten the two rope-ends together. Where the stakes were, tie two additional pieces of line for tying to trees or piazza posts; and in doing this tying make use of the simple but strong becket hitch shown in the diagram.

The barrel-stave hammock may be converted into a SWING-CHAIR without much trouble. Fasten a ring in the piazza ceiling near the house wall, and from the ring drop a rope that will hold one end of the hammock up about the height of the head. Three feet out from the wall put two rings from which to drop ropes as at B. An additional ring two feet farther still will provide for the foot rope, and the chair is made.

An advantage in many of the home-made articles is that we get good material. In this case, where a barrel is to be utilized, the wood in many localities is pretty apt to be of oak. You will realize this as you try to work the wood. You will need sharp tools and a firm grip. But such wood is enduring.

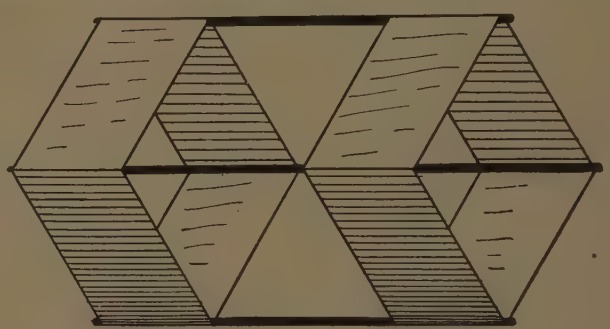


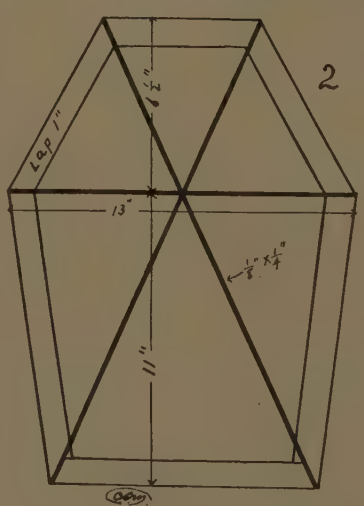
try several of the shapes here suggested. When you have once made a box kite you will be able to go on to any other model. No boy ought to grow up without being able to say that he has made and flown at least one kite. It is somewhat hard at first to learn just how to make the kite take the wind, but not nearly as hard as a sum in fractions. And the boy who does well in fractions will fly a kite well.

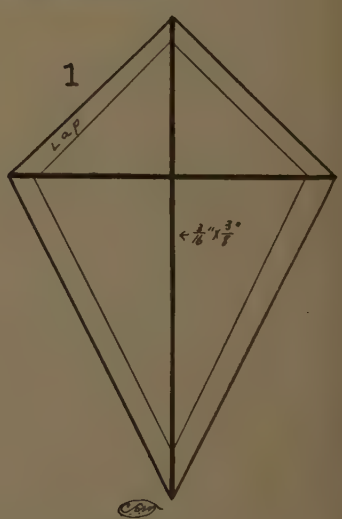
Everyone is interested in KITES, from Little Brother who holds the kite off the ground till Big Brother is ready to run with it and get it into the wind, up to the scientist who flies teams of box kites to carry his thermometers and barometers into lofty regions that he wishes to study.

Little Brother will probably begin with pasteboard sticks and wrapping paper pasted over them. But he will soon graduate into the second class, and make fliers of the good old traditional types shown at Nos. 1 and 2. These can be made in all sizes, and thousands of trials have proved their success.

To get ready for kite-time, go to a wood-working shop and see if you cannot pick up some strips of wood of about the right size. Take these to your work-bench and with a plane bring them down to just the right width and thickness. Have some $1\frac{3}{16}$" by $\frac{3}{8}$" and others slightly smaller and slightly larger. With a goodly supply of sticks on hand you will feel thoroughly ready to







Do not forget the tails for these kites

Bridle cords are not shown.

They go from each corner.

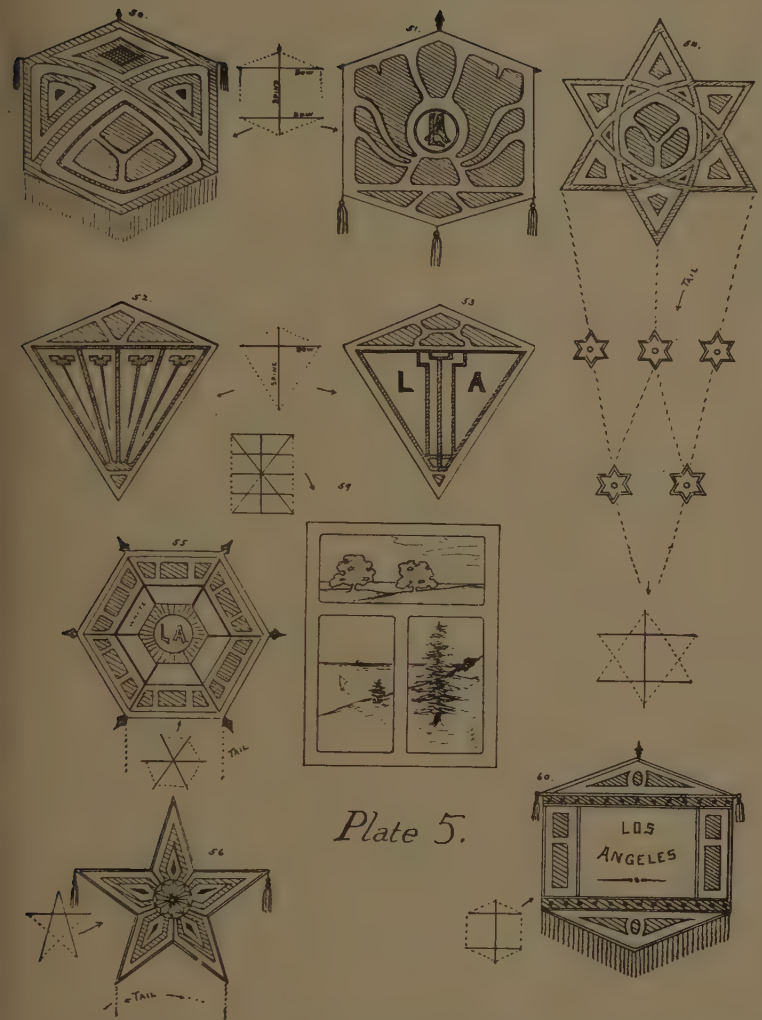
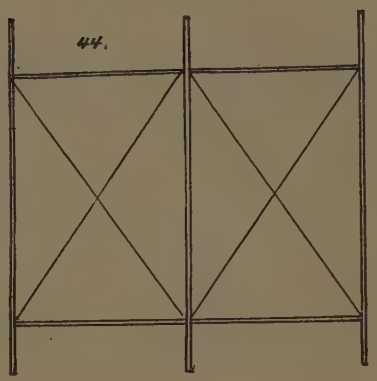


Plate 5.

As the plate on this page will suggest, the old-fashioned square or triangular form of kite may be varied in many ways, and decorations of all sorts may be added in bright colors. The kites here illustrated were made for a kite-tournament on the Pacific coast, an annual affair at which all the novelties that can be thought of are brought out. A gay scene it is when on a breezy spring day the red and blue and yellow and green paper birds fly at the ends of their strings. As a rule it is best to keep the designs simple, since when they are two or three hundred yards away in the air only the largest features are visible. Yellow and red are the most effective colors.

The simplest kind of box kite is pictured on page 58; and the plans for it are given on page 60. In essence it is two circular bands of muslin or silk or strong paper stretched over a frame made of four long pieces and four short "spreaders." The dimensions for a kite of average size are given on the diagram, and no special directions are needed for making the parts or putting them together. In this kite the spreaders are not bound or jointed. They simply fit into notches in the longitudinals; and they may be taken out and the kite folded up for carrying. It goes without saying that the spreaders must fit very exactly, for if they do not fit the kite will lack stiffness and strength. No box kites need tails. Their position when flying is altogether determined by the adjustment of the bridle cords. The wood for such kites may be of a great many sorts, but lightness and strength are of course the qualities desired. Whitewood and pine, bamboo, rattan and ash are good materials; and the ribs of an old umbrella are excellent for long sticks in some cases.

Box kites are all built on the same general principle; but like the sails of vessels, there is almost infinite room for variation. For the kite of ordinary size no help will be needed in holding it in ordinary weather. It is rare that a gust of wind will arise of sufficient strength to pull the string from your hands; yet it is well to know how to prevent this. A reel made of two cross-pieces at each end, strung upon a rod of either wood or metal, and braced with four pieces parallel to the rod, makes a good fastening. And when set in two notches cut in a box and fitted with a crank, it is a great comfort.



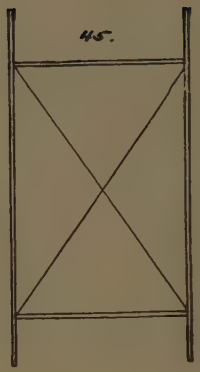
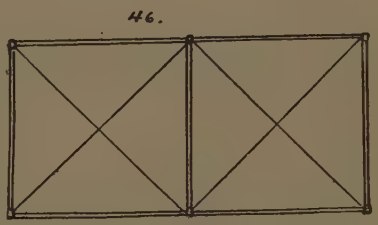
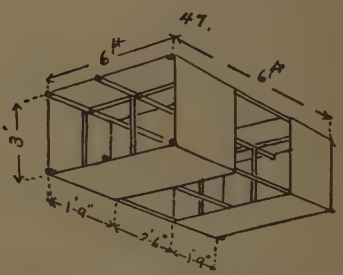


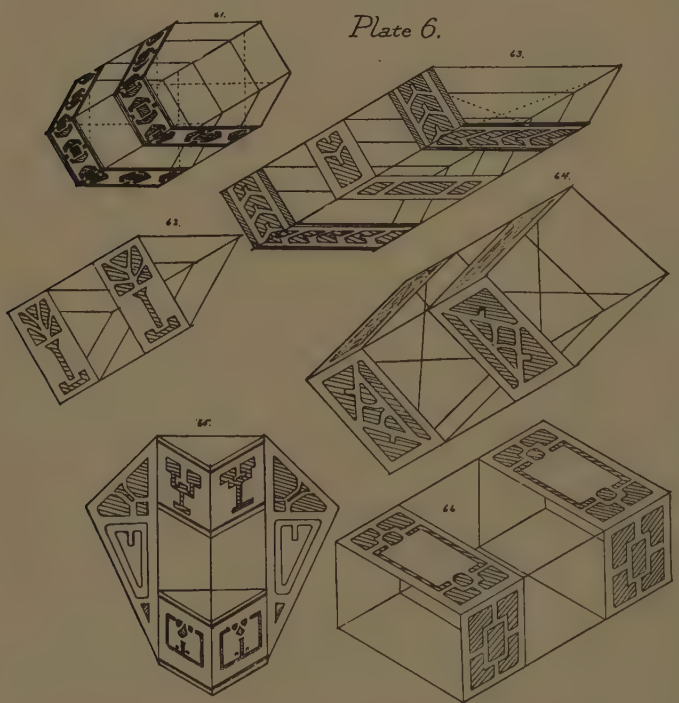
Plate 4.





The next step from the simplest form is a larger kite with a more complicated framework. The kite for which working drawings are given on this page is six feet long, and as broad as it is long. The frame may be successfully made of bamboo. If spruce or any soft wood is used, the two spines should be about $\frac{5}{8}'' \times \frac{5}{8}''$, the corner pieces about $\frac{3}{8}'' \times \frac{3}{8}''$, and the braces $\frac{1}{4}'' \times \frac{1}{4}''$. A light cloth is by all means the best covering for so large a kite as this. It may be sewn together first, after being hemmed, and then tacked to the frame after it has been stretched on. The frame should be strengthened by fine diagonal wires. Remember that for a kite of these dimensions you will need stout linen cord. You could not invest your money to any better purpose than in getting a plentiful supply of the very best kite cord made. Then you will be fortified against gusts of wind, and can sail your kite "out of sight" — or almost that.

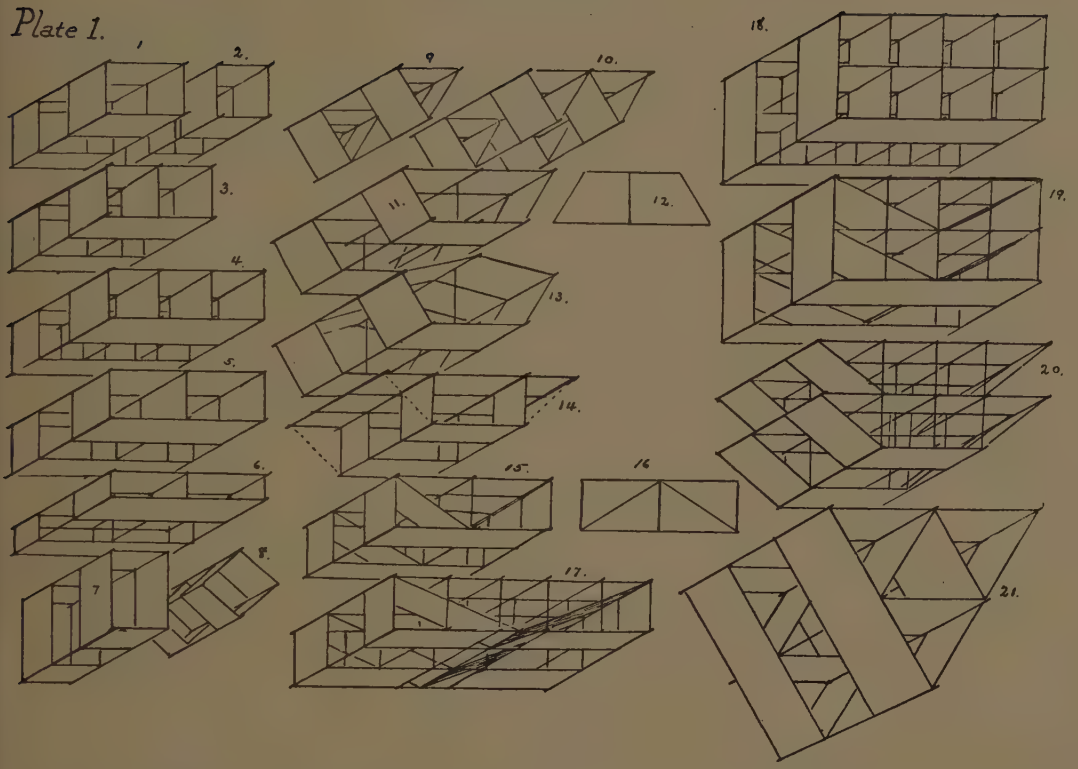
Plate 6.



If you care to, you can decorate your box kites as gayly as you did the simpler ones. Here are some sample designs to be worked out in paint-box colors or by pasting on tissue paper in various shades. You could make patterns from animal drawings to be found in several parts of this volume, and cut out paper forms to add to the effect.

We often miss the best part of our fun in this prosaic, hurrying age by omitting to make things beautiful, as well as useful or amusing. Even the savages ornament their commonest utensils where we make the corresponding article for our daily use of hard, ugly, undecorated cast iron, or hideously stamped in "pressed" wood, or daubed in hard tints by a machine. Let us make these kites strikingly beautiful in color.

Plate 1.



Here are a number of the possible variations on the box-kite idea. No. 1 is the simple two-celled rectangular model. No. 2 is the same, except that it is square. No. 3 is a combining of two of the second kind. No. 4 is three of No. 2, while No. 5 is two of No. 1, a very good arrangement for large kites. The lack of depth in the cells of No. 6 diminishes its power. No. 7 is unstable, and not at all a good construction. No. 8 is No. 2 flown on the diagonal by means of specially adjusted bridle cords. It is a steady flier, as are all kites with oblique planes that slant outward and upward. Sometimes a narrow, oblique surface will serve to give poise to a broad horizontal construction, as in No. 26 on the next page. The oblique surface becomes unstable as it approaches in angle either the horizontal or the vertical. The down and outward surfaces, such as are seen in No. 12, are very unstable. The oblique planes may be used on the inside, as shown in Nos. 15, 17, 19, 29, and 31; but they should never be used as represented in the diagram No. 16. Figures 18, 19, and 20 represent compounding in a vertical direction. No. 21 is a compounding of the triangular box kite No. 9.

The principles underlying all these forms and the practical effectiveness of all the types have been very carefully studied. It has been found by experiment that a greater efficiency is attained by allowing a greater distance, *c*, between the forward and back cells than the breadth, *d*, of the cell. This and other facts of the same sort were worked out by the famous inventor of the telephone, Dr. Alexander Graham Bell; and the Wright brothers kept them in mind in making the first aëroplane. Dr. Bell studies box kites extensively at his summer home in Nova Scotia. The airship had its forerunner in the kite.

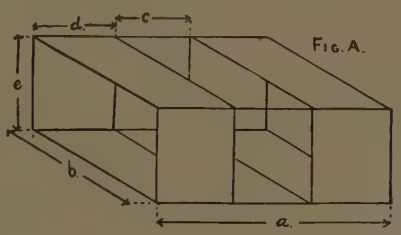
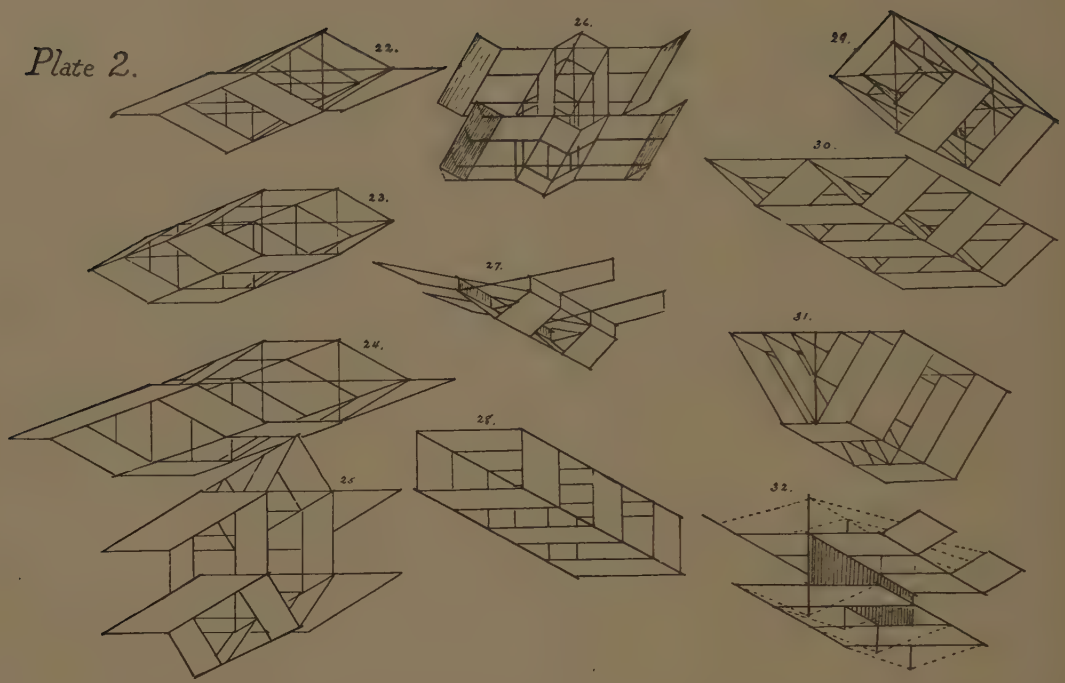


FIG. A.

Plate 2.



In fact, kites have had a long and honorable history which has culminated in the modern flying-machine; and now that the flying-machine is a success, and has become independent of its humbler forerunner, the kite is still serving scientists and aviators in the study of air currents at various levels; air currents being the great problem of the aviator.

The resemblance of certain kites to aëroplanes is more evident in this plate than in the last, and on the next page it is more evident still. All of these kites are held at the right angle by carefully-adjusted bridle cords; yet, as before, some are more stable and steady than others. No. 25 is not so steady as No. 26 with its additional oblique planes. No. 27 has the advantage of oblique wings and a body like the keel of a boat. No. 28 is a further variation by the increase of the number of cells lengthwise. No. 29 is a square box kite with a similar one constructed on the inside. No. 31 is probably the most stable of all, as all the oblique surfaces assist in giving poise. No. 32 is modeled after a large aëroplane. The resemblance of these kites to actual aëroplanes may be carried a long way, though perhaps not to the best advantage. The simpler and more standard forms of box kite are the best fliers in the end; and they are plainly much easier to construct.

The making of the more complicated kite frames will give you a chance to do a good deal of neat wood joinery. Kites should be taut as a drum, and strong enough to withstand sudden hard gusts. For purposes of strength it is especially important that all the joints should be of the right sort. Where one stick crosses another it is often best just to bind them together with heavy thread or light fish line. Where two sticks meet at a corner, one of the most satisfactory joints is the halved joint, in which a square notch is cut out of the end of each to half its depth, so that the two half-ends when brought together will be of the same thickness as a single whole stick. Through this joint it is well to drill a hole and set in a very small screw. If in addition the sticks are allowed to overlap an eighth of an inch, the joint may be wound round and round with linen thread. Where a stick meets another diagonally, it is also possible to use screws if great care be taken in drilling the holes. We are only just beginning to know something about the upper-air currents, and how they operate upon or against invaders of their sphere.

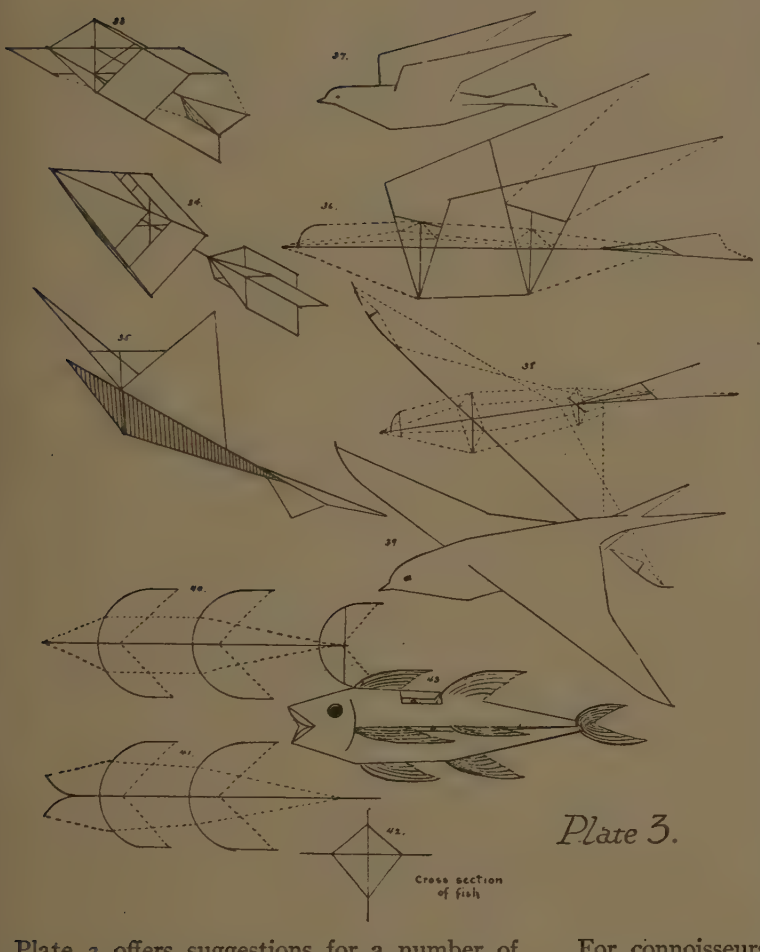


Plate 3.

Plate 3 offers suggestions for a number of curious kites, all of which will fly if well constructed. No. 34 is an arrow kite, striking in its novelty. To bring the ends together in a sharp point, first sharpen the central stick and then bevel the ends of the four converging sticks until they will lie flat along the center one. They may then be fastened in place with screws, care being taken not to drive all the screws into precisely the same spot in the center stick. At the rear of the arrowhead there are two cross-sticks, both at right angles with the center stick. It is best not to try to joint the three together, as all three would be weakened if this were done. The two cross-pieces may be half-jointed or pinned or screwed together; but let them be simply bound with thread or string to the center-piece. Between the ends of these two cross-pieces go four sides; and the problem at the corners is to fasten four ends securely. If the sides are half-jointed, a hole may be drilled through this joint and through the cross-piece end, and up into the fourth piece, and a screw inserted. This is naturally a very difficult bit of work; and another construction scheme may be adopted. Instead of sticks for the back and sides of the arrowhead, use wire or stout cord. If cord or wire is used, there will come up the new difficulty of fastening the cloth to it. This will have to be done by over and over sewing, much as sails are lashed to a boom. In case heavy cord is used, the threads may be occasionally sewed through the cord, thus holding the cloth firmly in place. With wire there is nothing to do but to sew tightly. This arrow kite will be particularly handsome if given a vivid coloring.

For connoisseurs and experts there remain some very difficult hollow forms of kite, like the bird and fish kites in the plate. In the drawings, the solid lines represent sticks, the dotted lines cord. It will be far from easy to get the muslin coverings to fit the frames well; and only the pleasure of seeing these unusual figures in the air will draw the artificer on and keep him at the task until it is done. Bird kites may satisfactorily be covered with white paper. The fish does better with a covering of cloth; and if the fins be made of silk, with fringes, the effect will be realistic. It is worth noting that the later airships are following closely the lines of birds. A young inventor living near Boston discovered, during the year 1912, that he could take advantage of this, to operate an aëroplane without extra power. These kites suggest his models.

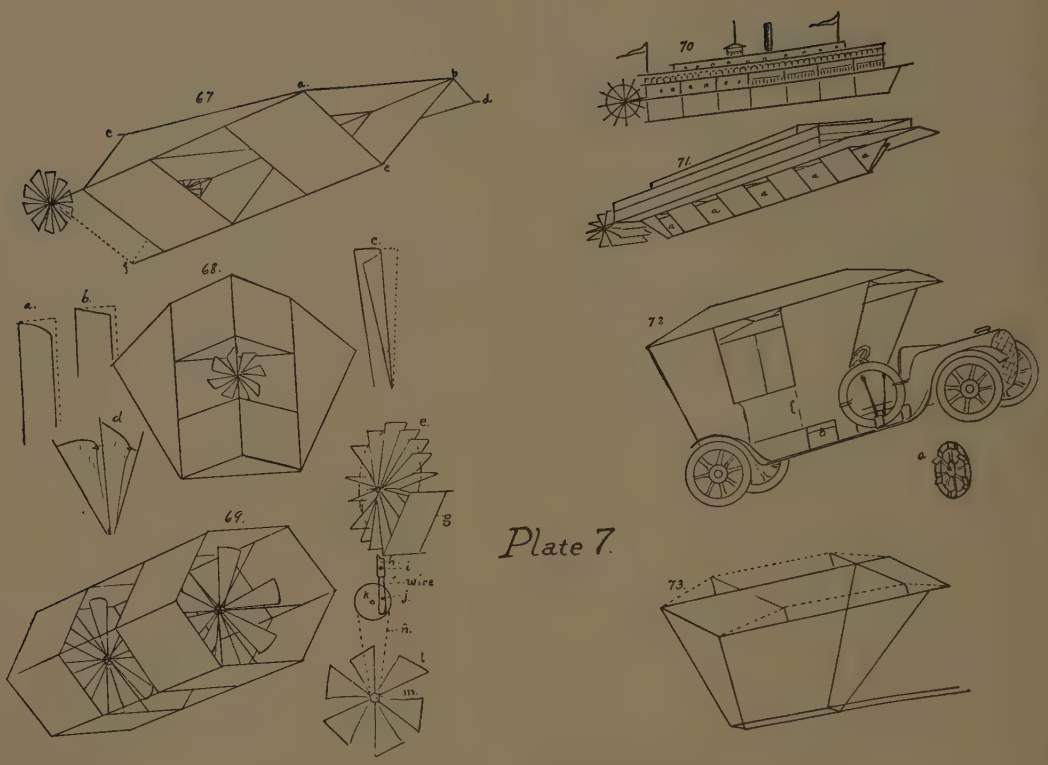


Plate 7.

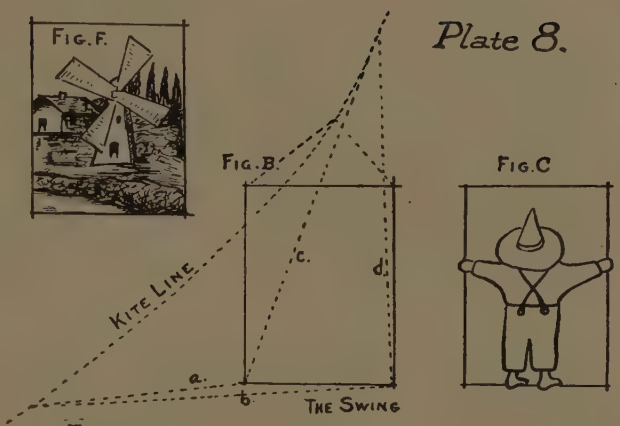
There is practically no limitation upon the number of different objects that kites may be made to imitate. A few of these possibilities are shown above.

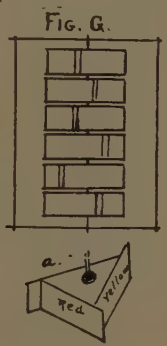
In No. 67 the especial novelty lies in the addition at the ends of the two top sticks of two pinwheels cut from tin and turning on sails driven into holes bored in the sticks. In the larger wind wheels shown in No. 68 and No. 69 the blades or wings may be turned in various ways, as the diagram indicates. One of the most surprising of these wheels is the one that turns edgewise to the wind, a shield sheltering the lower half of the wheel from the force of the wind. This wheel should be made of pasteboard wings or paddles set into saw-cuts in a wooden axle and held apart at the outer ends by a wire hoop.

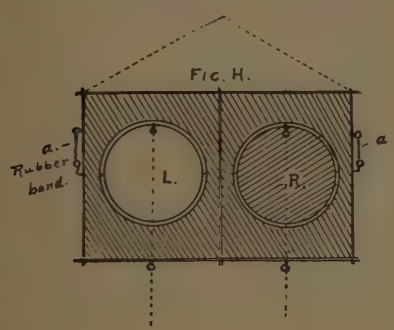
As a last word in the novel and curious come the steamer and the automobile. If the boat stands too obliquely in the air, the difficulty may be overcome by shifting the bridle farther to the front, or if this is not satisfactory, an oblique plane slanting downward will help to raise the rear; but an opening must be left to allow a passage of air to the wheel. No. 71 shows the general block construction of the hull. It is made up of a flat, rectangular box kite and a triangular box kite. By using a vertical plane *a*, *a*, *a*, shown in No. 71, the hull will have a somewhat solid appearance from the side, and at the same time give chance for the vents which are absolutely essential to box-kite construction. The side above the lower deck could be solid, but the top must have vents. A kite of this kind is only for the more ambitious, but it can be made a great success.

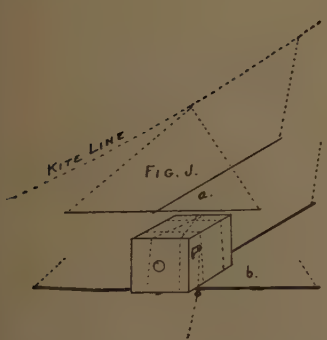
The automobile is a triangular box kite and, with the back oblique surface at the top, should stand up quite respectably. The body may be red, the top black or tan, the tire case black, the levers and lamps gilt, and so on. The engine space should be left open at both ends with string across the opening to represent a screen. The sides of the car must be drawn in at the bottom, but this will not be seen. See if you cannot think out some simple form, not mentioned here, that would be suitable for kites.

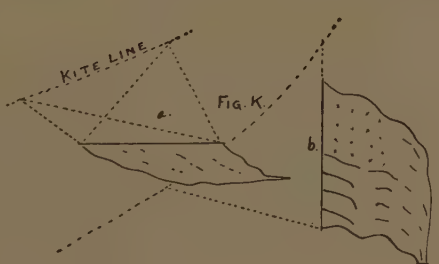
Plate 8.





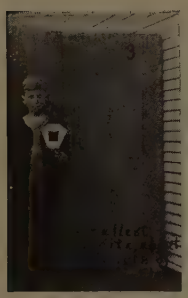






nately. Each section of a fan should have its own color; and there should be as much variety throughout as possible.

The signaling device, Fig. H, consists of a framework with a vertical piece of wood running down the center. The whole space is covered with a light-weight cardboard, or heavy paper. Two circular openings are cut in this cardboard in which revolve two circular discs a trifle smaller than the openings. The whole device should be large enough to allow the discs to be at least twelve inches. A thin wooden strip should be fastened across the discs for stiffening. To operate, two strings are necessary. If red and white discs are used, the same code could be used for a red and white light at night, and for wigwagging as well, the red standing for the right flag and the white for the left. The lower diagram shows how to attach a small camera to the kite line for taking bird's-eye views of wide stretches of country or city. It shows also how flags and streamers may be tied on. Nothing is prettier than several flags in a row. Select four of the most striking, such as the American, British, Japanese, and Siamese.



In signaling, use the following code, which is adapted from the wigwag or Myer code of the army. L = left, or white; R = right, red.

A	LL	J	LLRR	S	LRL	2	LLLL
B	LRRL	K	LRLR	T	L	3	RRRL
C	RLR	L	LLR	U	RRL	4	LLLR
D	LLL	M	RLLR	V	RLLL	5	RRLL
E	RL	N	RR	W	RRLR	6	LLRR
F	LLLR	O	LR	X	LRLL	7	RLLL
G	RRLL	P	RLRL	Y	RRR	8	LRRR
H	RLL	Q	RLRR	Z	LLLL	9	RLLR
I	R	R	LRR	1	RRRR	0	LR

This is a good code to know, whether or not you use it for kite signaling. If you let the letter L represent the waving of a flag to your left, and the letter R represent the waving of a flag the other way, you will have the key to military long-distance signals. Make two copies of this code on cardboard, give one of them to your chum, and get him to wigwag to you from his house, or from the other side of the pond or meadow. You can have a good deal of fun in this way, and some day your ability will be of real service to you. It might be mentioned here that there are two other important methods of signaling, one using the Morse code, such as telegraphers use, the other using what is called the semaphore code. You will find these described in Volume VI, page 72.

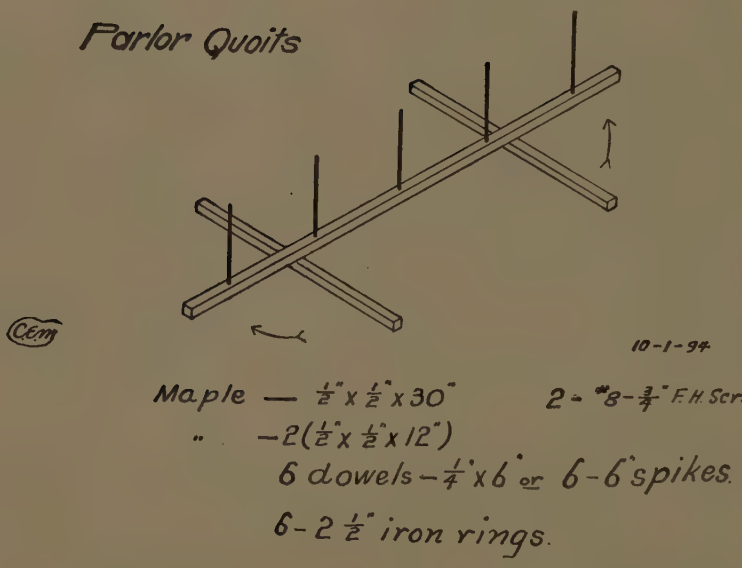
If you will set your ingenuity at work you will be able to devise many kite-attachments besides flags and signaling apparatus. Parachutes may be sent up and released by the pulling of a string. In the same way flags may be sent up folded and tied and then "broken out" as they are at a ship's masthead, by the pulling of a slip-knot. Small light boats with square-rigged paper sails may be made to glide up the kite string on screw-eyes. It is even possible to fasten old knife blades upon the kite string so that you can have a duel with a friend whose kite is likewise armed, your aim being to maneuver your kite in such a way that you can cross his line and cut it with your blade. Advertisers have long been aware of the possibilities that kites offer, and any breezy spring day in the city or at the county fair is likely to bring out a tandem or so of box kites supporting a stuffed figure on a trapeze, or something of that sort. In the picture above you may see what certain boys and girls accomplished in a recent kite tournament.

If you had a team of big box kites, you could attach to them the aërial of your wireless apparatus and thus get the aërial up to a most advantageous height. The kites would have to be strongly built, and cloth-covered, and the day would have to be one of steady wind. With all the difficulties overcome, and a friend a distance off sending you messages, you would be able to sit as this boy does in the picture, in supreme satisfaction.

The boy beside him is operating a kite reel made from the parts of an old bicycle. By means of the gearing he can let out or draw in the line rapidly; and kites are sometimes like nervous fishes on the end of the fish line,—they have to be "played." The drum around which the line is wound is not solid with line, though doubtless the owner wishes it were. The drum is a section of rounded log, the great size of it being needed to make the line come in fast. Notice the guard of smooth wire over which the line passes, in case the kite flies low.

One of the most difficult and most satisfying of all the things you can do with a kite is to take bird's-eye views with it. If you will turn back to page 65 you will find the drawing of a light frame to which the box camera is to be attached. By adjusting the lines you can make the camera point either toward you or away from you. The direction of the camera must depend largely upon the wind and the sun, as you cannot take good pictures with the lens facing the sun. A hole must be bored through the shutter arm of the camera, and the light tripping string must pass down through a screw-eye in the platform rod before it runs to the kite-flier. Obviously you will have to set the shutter with the arm up. The two photographs above were taken by the method here described, and they show what can be done. In Fig. 12 the boy who was flying the kite arranged the camera so that it pointed toward him; and if you will look closely at the picture you will see the boy himself. He is down there on the sidewalk near the corner of the big building, a mere white speck. It is not much of a portrait of him, to be sure; but you may depend upon it, he thinks it the most interesting picture he owns.

Did it ever occur to you to fly kites by night? Probably not, for two reasons: the wind usually dies down at night, and the kite could not be seen even if it could be flown. But there are evenings when kites will fly, and it is perfectly possible to string from them an array of small paper lanterns, such as you can buy or make. A group of kites holding up red, yellow, and green lanterns makes a wonderfully beautiful show. What could be more fascinating and at the same time instructive, than to grade the lanterns according to the solar spectrum, even to close blending of colors.



liquor barrels. These barrels are usually so well made that the heads stick together pretty well, but even so it would be safer to cleat them on the back side, using thin oak and screws. Then describe your circle accurately, and paint it in with good "drop black" oil color. This comes in very small cans, costing not over fifteen cents. Make the circle-line ¼" thick. Find the points for the star by trying until you come out even. Then carefully draw in the star. You must take care not to lose the point from where you struck out the circle—its center. Now mark the numbers neatly in your best lettering, and draw in the star-rays about the central point, where the circle and the magical "100" invite the master-throw that will bring you "out." Now shellac the whole, and you will have a capital game-board. Hang it by whatever means you choose, but so that it will hang vertically. Of course you could make it of some other size, and from other material than oak. The spaces left between the points of the star and the circle invite good decoration.

JAR-RING TOSS. What an odd name! Yes, to be sure. But do you know why it is given? An American educator found a little crippled English boy playing it in his tiny but lovely back yard, at a little inn kept by his mother in Coventry. And you would better make the things for the game just as he had made them. He had taken a barrel head, cleated it across with sticks to keep it together, and covered it with brown paper; and on this, with only a string and nail, he had struck out a circle and made his five-pointed star. Into every angle and into the center he had driven long, slim wire nails, and then bent each one upward with pliers, so as to form hooks, like clothes-hooks. The game he had invented was to throw rubber rings and try to catch them on the hooks. What a clever invention for a little crippled chap, all alone because he could not keep up with the others, yet sunny-hearted and busy-minded! The rings he used came from his good mother's preserve jars, and were made in America. It is a new form of a very old game-play, but it is fascinating, and of course you can make it without directions. Never let Mother throw away her old rings. But while you are about it, why not make a game like this, only putting into it your very best thought and skill. Probably nothing would serve better than a really good barrel head, say one of oak, if you could get one, of which so many are wasted on

PARLOR QUOITS. During the cold and stormy days the whole family will find themselves "half crazy," as the expressive if inaccurate saying has it, over this ancient game in its indoor form. The way to make it is so plainly shown in the diagram as to need no further directions. Rings may be made from wire, such as that found on baled hay. Make them about 8" in diameter, double wire, and wound with raffia or tape.

PAPER CRAFT

PAPER, scissors, a tube of paste, and a little gumption, and there is no end to the amusing and useful things that can be produced! Beginning with silhouettes of common objects, and, as one gains in skill, passing on to objects produced by folding and cutting, the steps are easy to objects in three dimensions, objects of real value in the home life.

SILHOUETTES. From common wrapping paper cut freehand — that is, without drawing in pencil first — any common object: a table-knife, a spoon, a shovel, a watch. When objects have two sides just alike, fold the paper, and one cut will do for both sides. With the paper folded, inside cuts may be made, such, for example, as the inside of the ring of the watch. Next try a pair of scissors, a pear, a crook-necked squash, a bird, a cat, a man, — anything, in fact, which presents a significant silhouette or shadow. The clippings may be mounted on leaves of lighter or darker paper, with a paper frame at the edge, of the same color as the object represented. These leaves may be kept in an envelope, or bound into a booklet.

COMPOSITE SILHOUETTES. The illustration on this page is an example of a composite silhouette. It consists of one large silhouette, that of the Christmas tree, and many smaller ones, the toys and other common gifts hung upon it.

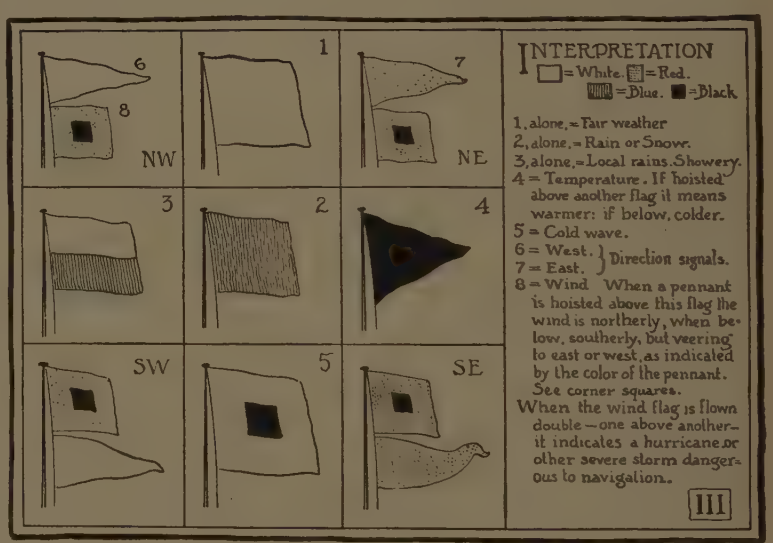
Shop windows, cupboard doors of glass, showing preserves upon the shelves inside, book-cases with doors of glass, showing books bound in various colors, are in the same class with the Christmas tree as interesting projects.

The TOTEMS shown at the top of this page are composite silhouettes. Each is a boy's private symbol, made of colored card with paper insignia pasted on. Raffia was used for the loops, in some cases, and cord in others. Attractive BOOKMARKS may also be made in this way. SILHOUETTE PICTURES, illustrating Mother Goose, fairy stories, and historic incidents are fascinating subjects. Two incidents in pioneer history (often repeated) are shown on the next page. Colored papers may be employed advantageously in making pictures of this sort.

The SIGNAL FLAGS used by the Government in its weather bureau service, yachting signals, the flags of all nations, and banners of every description, the shields of the knights of old, with their armorial bearings, and many other flat objects may be worked out most attractively in white and colored papers.

Indeed, silhouette-cutting was once a regular art or profession; and some men made not a little fame for themselves by cutting out clever outline pictures of people who wished to have their portraits made. Before the days of the photograph and the daguerreotype, there were no really cheap ways of having one's picture made. The silhouette came nearest to being a quick and reasonable method; and as a result we find among the heirlooms of the present old profiles in black upon a white background. There are still men today who cut out portraits of this kind; and we may imitate them after a fashion.

If you wish to apply your silhouette work to pleasant and sociable uses, here are two suggestions for you. When next a friend of yours is going on a long journey, across the continent or across the sea, make for this friend a silhouette steamer letter, or train letter. On large-sized letter paper paste an array of little figures and objects that will make your friend think either of the home he is leaving or of the new locality he is nearing; or of the things he is seeing around him as he travels, — icebergs, sailing vessels, cathedrals, and so on. Then write messages between the objects. In the same way get up a letter for someone in the hospital. You can have no idea of the heaviness of time while one is getting well, in even the most beautiful of hospitals.


6
8
NW
1
7
NE
3
2
4
SW
5
SE
INTERPRETATION
□=White. ▨=Red.
▩=Blue. ■=Black
1, alone,=Fair weather
2, alone,=Rain or Snow.
3, alone,=Local rains. Showery.
4=Temperature. If hoisted above another flag it means warmer: if below, colder.
5=Cold wave.
6=West. } Direction signals.
7=East.
8=Wind When a pennant is hoisted above this flag the wind is northerly, when below, southerly, but veering to east or west, as indicated by the color of the pennant. See corner squares.
When the wind flag is flown double — one above another — it indicates a hurricane or other severe storm dangerous to navigation.
III

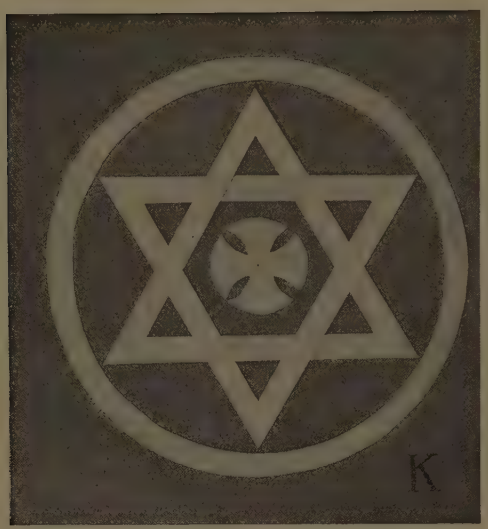
paper will be little better than black, so far as opaqueness goes. Without getting into too great complications you can make the picture true to nature. You can make the sky blue, the hills light green, the trees a darker green. For a winter scene you can leave the hillside white, and perhaps put a band of yellow in the sky just where the hills come against it, with slate blue above like a winter sunset. Beautiful sunset panels may be made by the use of yellow, red, and dark gray in the sky, seen through a network of forest boughs in dead black.

TRANSPARENCIES. Scenes and situations like those here given may be silhouetted in a number of different ways. They may be cut out in black and pasted on white paper. They may be cut out in colored paper, as already suggested. Most interesting of all, they may be made into transparencies. The ground of a transparency, upon which all the parts are pasted, should be either of oiled paper, or of tracing paper, or of the very thinnest tissue paper. If you want to have the best fun in making the picture, paste a sheet of this thin tissue paper by the edges upon an old window-pane. Have the sheet a little larger than the final picture is to be, so that in the end you can remove the sheet from the glass without injury. With the ground once firmly fixed upon the glass, you can go ahead with the rest of the work, able at any time to hold up what you have done and see it just as it is going to be seen later.

In making the various parts of the picture, use comparatively thin paper, as thick colored

As a novelty try making a transparency all in gray, by putting one layer over another of white tissue paper. Cut these layers in the forms of city roof lines, and paste each one a little below the one before. When the edges of this are pasted between duplicate frames of

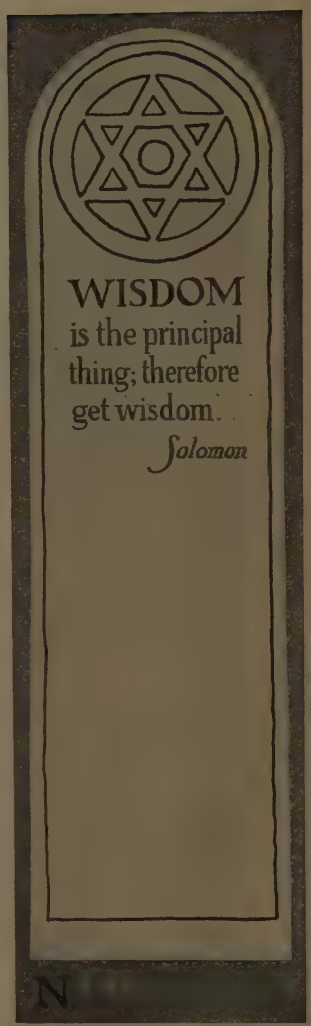
cardboard (as all the transparencies should be) you will have a remarkable likeness of a city in the mist of early morning. Charming effects of mountain landscapes may be made the same way.



The CHRISTMAS CARD above is made by pasting red and green paper upon a dark red ground. When a pattern for the triangle has been made and two have been cut out of green paper, one should be placed upon the other and the point marked where it can be slit so that the slit will not show after the two have been interlaced. The triangles symbolize the divine spirit; and the star-form of the two triangles, together with the Maltese cross in the center, makes this appropriate to the Christmas season.

The triangle is also a symbol of wisdom, and it may well be used in the making of a BOOKMARK like that upon this page. The quotation is especially to the point, since the symbol above it forms the "Seal of Solomon."

PLACE CARDS like those shown below are painted in water colors. If you do not care to take the trouble involved in painting, you can make cards that will be attractive by pasting upon suitable paper either silhouettes or parts of pictures cut from magazines, and then adding the necessary lettering. It is a pity to let any of the great days of the year go by without place cards at the festal dinner. Christmas, the Fourth of July, and all the family birthdays at least ought to have this final touch added to their celebration. And Thanksgiving by all means should not be left out. The turkey on the platter, the apple or the orange; and then the star, and the evergreen tree; — these and dozens of others come to mind as objects to cut out in appropriate colors. Firecrackers or pressed flowers or sprigs of holly or of evergreen may be pasted bodily upon the cards with pleasing effect. There are many beautiful possibilities in bookmarks for Bibles, in the several varieties of the Cross. Can you name the four best known?



Someone once said that BOOKMARKS should never be used. He said that we should fix in memory the page where we close the book, and not be so weak-minded as to need a mark. But we, on the other hand, may suspect this person of being an old fogey; and we have a perfect right to relieve our minds of the bother of recollecting useless numbers, and give the work over to neat little bits of cardboard.

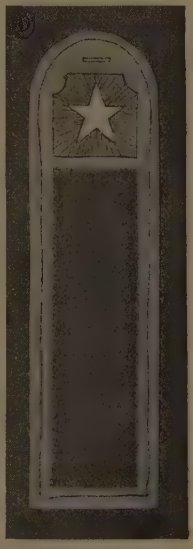
BOOKMARKS CUT FROM COLORED PAPER

Very presentable bookmarks may be made by simply cutting shapes out of heavy colored paper or out of thin cardboard. Anything put between the leaves of a book should be thin, lest the back of the book be strained and cracked.

PAINTED BOOKMARKS

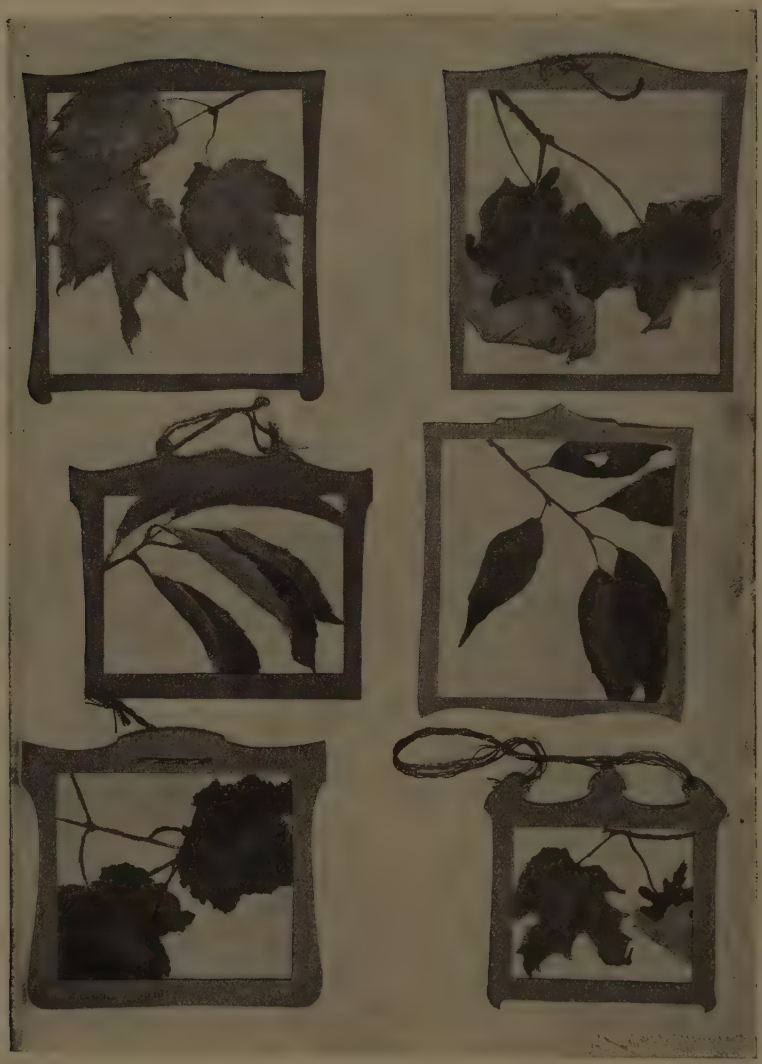
To make symmetrical shapes like those in the illustration it would be best to make patterns of old paper first, so that you could run your pencil around them on the cardboard and by cutting with scissors just inside the line get a perfect outline. When the card is cut out, take a pen-knife with a blade very sharp at the tip and incise small channels like those shown above. In this case too it would be better to have pencil lines to go by.

With your water-color box open before you, and with strips of heavy water-color paper ready, you have ever so many bookmark possibilities awaiting your wit and inventiveness. The samples shown on this page are decorated in a holiday fashion such as would make them interesting and useful Christmas presents. Why not give a bookmark of your own making with every book you give,—and decorate the card with something appropriate to the book, so that the two would always be kept together?



A MATCH STRIKE

With heavier cardboard, but with the same painting equipment, you can make a handy bit of wall furniture, a match strike. The card should be six or eight inches long; and it should be decorated in panels, one of the panels to be filled with fine sandpaper. Burnt matches themselves might be used as a symbol for the decoration. Good design makes or mars any article, however useful.



LEAF TRANSPARENCIES FOR THE WINDOW

You know that leaves of summer green and autumn leaves look at their very best when sunlight is shining through them. Did it ever occur to you that the same thing is true of a drawing of a leaf? It is, and if you will frame a leaf-drawing as those above are framed and hang it in a window, you will surely agree.

The drawing for one of these transparencies should be on fairly thin water-color paper. The drawing will finally fill some definite space, like four by five inches, or five by six; and you might at the outset pencil off the space and keep the drawing within it. But perhaps the most interesting way is to draw a leaf-spray without especial regard to any particular space, and then, when you have cut the frame out, lay the frame over different parts of the design and decide which will fill the frame most attractively.

Often much of the beauty of autumn leaves comes from the blending of colors in them. To blend the colors on the paper it is necessary to add the new color while the old color is still moist on the paper. Suppose that you wish to fill the outline of a leaf with green at the stem grading into scarlet at the tip. First use a brush with plain water and go over the whole surface of the leaf, keeping carefully to the outlines. Then take a brushful of green and apply it at the stem. As you work along toward the tip, remove the brush from the paper once or twice to dip it in water and thus weaken the green. When you get to the tip, wash the brush clean and partially dry it on a cloth. With the brush in this condition you can remove green from the tip if there happens to be too much there; and no sharp outlines will show within the leaf. Then promptly apply the scarlet, reversing the process, and the blending will be perfect.

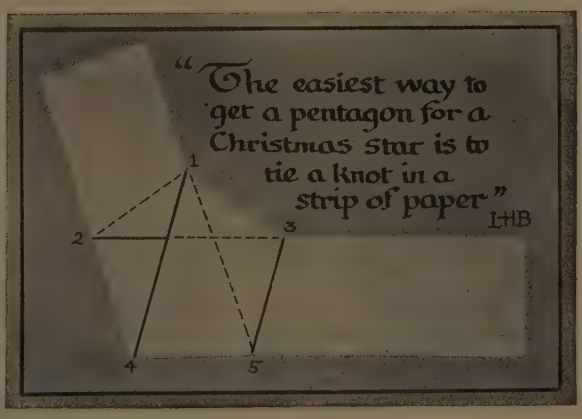
Cut a pattern of the frame first, experimenting with various proportions and with various soft, gentle curves for the outsides. Then lay the pattern off on dark gray or sepia mounting paper, cut out the frame, and paste the desired part of the design upon it. You can also make a simpler form of color effect, in a series of leaves painted in plain green.

An excellent SHADE to keep the light of the lamp from shining into the eyes of your father over there on the sofa may be made in the form of a half-transparency. Convenient sizes range from seven to ten inches in width by two-thirds as much in height. Get two stiff sheets of paper or light cardboard of the allotted size, and in both of them cut out the main outlines of the object with which you mean to decorate the shade. If it is a butterfly, as in the illustration, cut out openings for both parts of each wing, for fore and hinder body, and for the feelers. The parts have to be separated to leave strong ribs of paper. Next select a piece of very thin white paper, as thin as it can be and still take water-colors. With one of the stiff sheets as a pattern, mark the outlines with pencil on the thin paper, and fill in the outlines with bright colors, taking some real butterfly as your model. To complete the shade, lay the painted sheet between the other two, and run gummed binding paper around the edges. The shade is to be hung from the lamp-chimney with wires. The wires in the illustration are nothing more nor less than hair-pins.

A SHADE TO HANG BEFORE THE LAMP

When the first of February arrives it is time to remember that spring comes in at the end of the month, and St. Valentine's day in its middle. There are dozens of possible forms of home-made valentines; and one of them is suggested on this page. Above all else in a valentine the touch of your own personal handiwork counts.

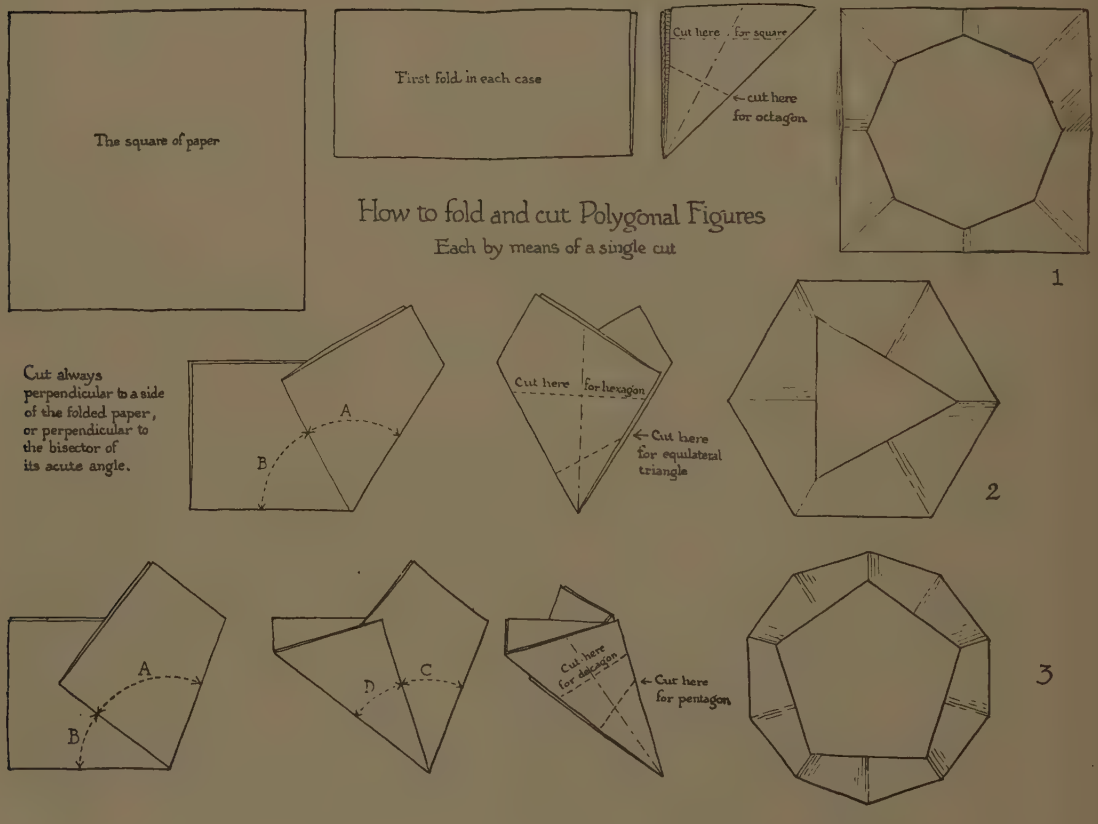
Without knowing anything about geometry it is possible to make a five-sided or pentagonal figure in the way suggested below. When the "knot" has been tied, the edges that you will see are those shown in solid lines in the drawing, the dotted lines being behind. Try the knot first with a long and very narrow strip. Tie the knot loosely, and gradually tighten it.

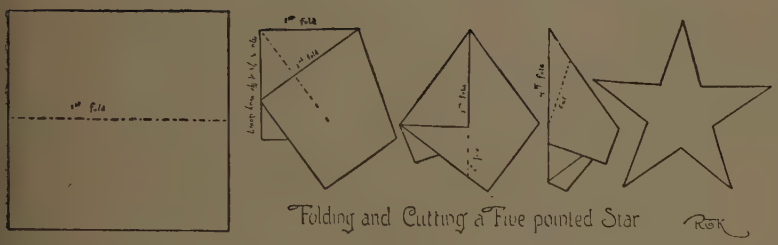


SNOWFLAKES

SNOWFLAKE FORMS CUT FROM FOLDED PAPER

It is fun to cut snowflakes of tissue paper, — after you know how! All the flakes here shown were made by snipping *one edge* of a folded square of paper. The way to do this is shown in the illustration below. In making the second fold for the triangle and hexagon A must be equal to B. In the case of the pentagon and decagon A must be just twice B, so that when the next fold is made C will be equal to D. In making these forms, it is well to use thin paper. When cutting, hold the paper firmly and use sharp scissors. Mount your work on dark brown paper. Catch a snowflake or two and look at them through a magnifying glass. They will give you new variations of the hexagon to cut.

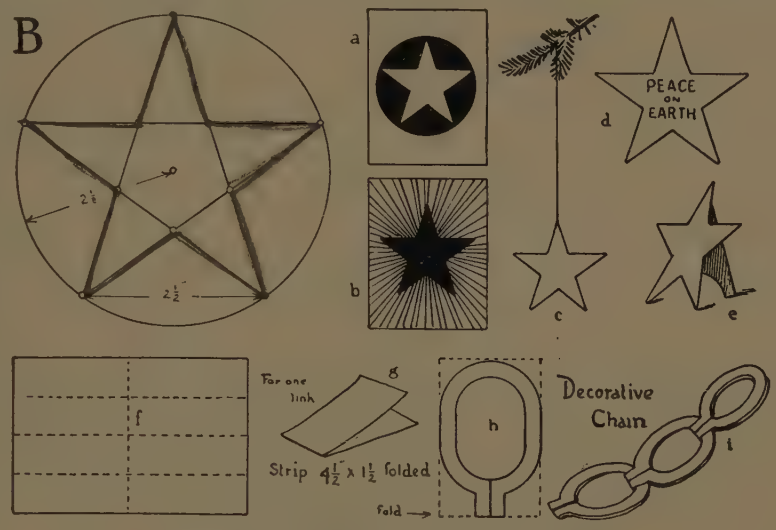




hatpin at the points indicated, you will have a useful pattern for as many more stars as you care to make. The plate also suggests various things to do with stars, pasting them on sheets of different colored paper, or cutting them out in cardboard for the tree, or printing a motto on them and setting them up easelwise. The remaining figures in the same plate show how to make small strips out of a large sheet, and how to form these into a paper chain. And patterns are given below for making a most attractive garland chain of paper leaves. The holly leaves should be bright green, the berries bright red. The holly and its berries with the mistletoe were much in evidence during the Twelve Days that Christmas was celebrated in Merrie England, as it still is by many.

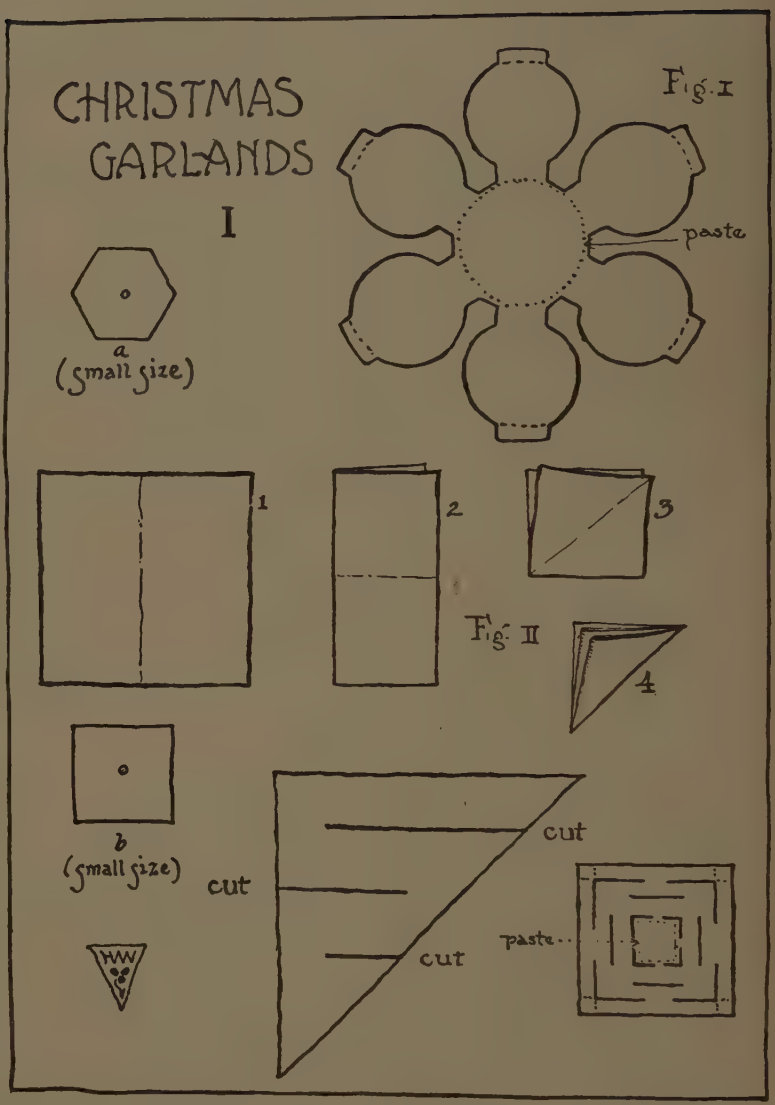
Our memory of Christmas is pleasant partly because of the presents we get, and partly because of the fine friendly feeling that everyone feels then, and partly because of the beautiful decorations which it is the good old tradition to place in profusion all about the house, to express the Christmas gladness.

Many decidedly pretty decorations may be made of paper: and first, the five-pointed star. A square sheet is folded in the middle. With the fold up, bring the right-hand corner over to a point two-thirds of the way down the left-hand edge. Then fold the upper left-hand corner down, and then the left-hand side over upon the right. Match the appearance of your foldings with those in the plate. If you do the work correctly, a cut along the dotted line will produce an admirably regular star.



PAPER DECORATION FOR THE CHRISTMAS TREE

Another way of making the star is illustrated at B. If a circle is drawn with a radius of $2\frac{1}{8}$ inches, then the points of a star within that circle will be almost exactly $2\frac{1}{2}$ inches apart. If you will draw the circle on cardboard, connect the points with an intersecting line, and punch holes through with a

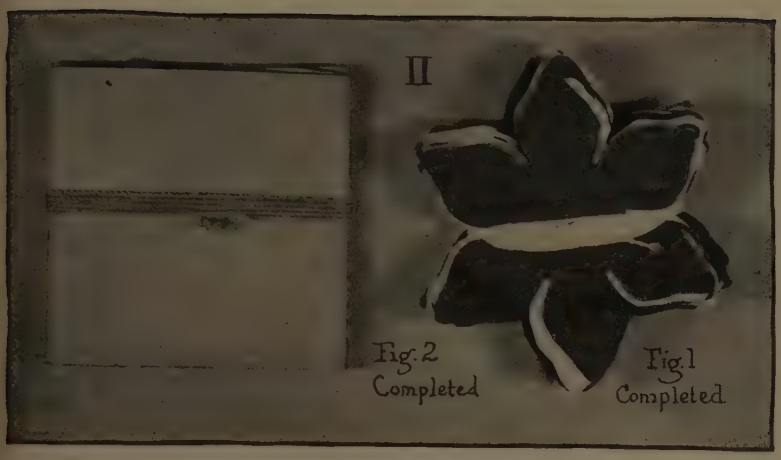


PAPER GARLANDS for Christmas time are manufactured in great quantities by the clever and Yankee-like Japanese. They look marvelously complicated when they are displayed; but there is no special secret about their structure, and we can make a festive array of them if we have patience and a little skill.

To begin with, we should have plenty of tissue paper of colors that will go well together. The following are good combinations: dull red and dull green, alternating, of course; cream and dull red; cream and dull green; light yellow and orange; two tones of red, or two tones of green. The paper should be cut into small squares. If the leaves are about four inches across, fifty of them will make a garland about three feet long. From this estimate the amount of paper you will need, as well as the amount of time and patience. But the time will be pleasantly spent, and the results will be not only pretty but lasting. For a garland that will extend all the way across the room may be packed into the thickness of less than an inch, and stowed away until it is next wanted. The cutting of these small squares will be made much easier and pleasanter if you have a print trimmer such as photographers use. A trimmer will be useful in countless ways.

In the illustrations on the next page you will see a garland compressed and ready to be put between the folds of a sheet of cardboard for mailing. You will also see two forms of garland displayed.

For the flower form of garland a pattern like that of Fig. 1 is needed. It should be made of thin but tough card, so that it may be used again and again to lay upon the paper and mark around. There are two ways of putting the leaves together when once they have been cut out. According to the first way, lay a leaf upon the table, and touch each of the six ends with paste (flour paste or library paste); then lay a second leaf upon the first, and press the ends together. This pair should be of the same color. It is well to have a damp towel folded neatly at one side, with a dry one near by; your hands will be cleaner and your work better.

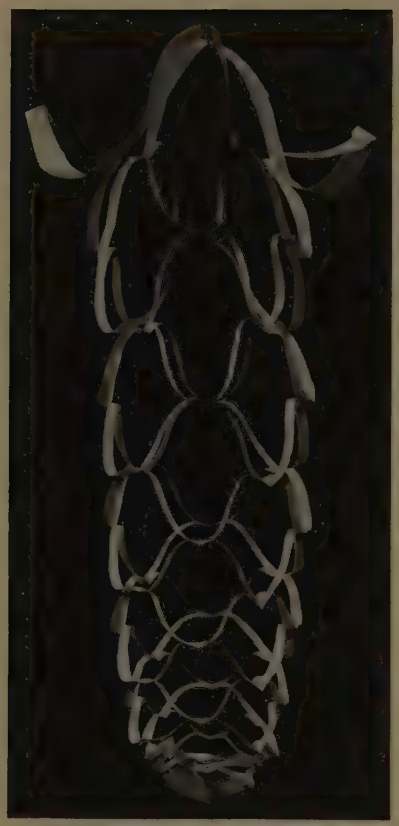


A PAPER GARLAND WRAPPED FLAT, READY TO MAIL

When the first pair have been joined, put a little paste in the center of the second leaf and lay a third upon it. Then put paste on the ends of the third, and lay on a fourth. From this on continue as before, alternately fastening the flowers by the center and by the tips, and keeping them in pairs of like color.

There is another way of putting the parts together, this second way giving the results shown in the garland here illustrated. The process runs through the following stages. Let us suppose that we are making a garland of red and green. First, lay a green leaf before you; second, put a bit of paste on each of the six ends; third, lay a second green leaf on the first; fourth, press the ends together; fifth, put a bit of paste in the center of the second leaf; sixth, lay on a red leaf; seventh, press down the center of this leaf; eighth, put a bit of paste in the center of the red leaf; ninth, lay on a green leaf; tenth, press down this green leaf in the center only; eleventh, put a bit of paste on the ends of the green leaf. Then lay on another green leaf, and proceed as before. This method, you see, provides for an extra leaf between the pairs of flowers. This leaf stands out flat when the rest of the leaves are pulled long and round.

To make the other sort of garland here shown, fold and cut small squares of paper as explained in the lower part of the diagram on the previous page. The squares should be four inches or a little less across. The pasting of the squares after they have been folded, cut, and unfolded again is much like the pasting of the flowers by the first of the two methods given above, the corners and centers being joined alternately. Compared with the gathering and making up of evergreens from the woods this method has much to commend it, especially in bad weather.

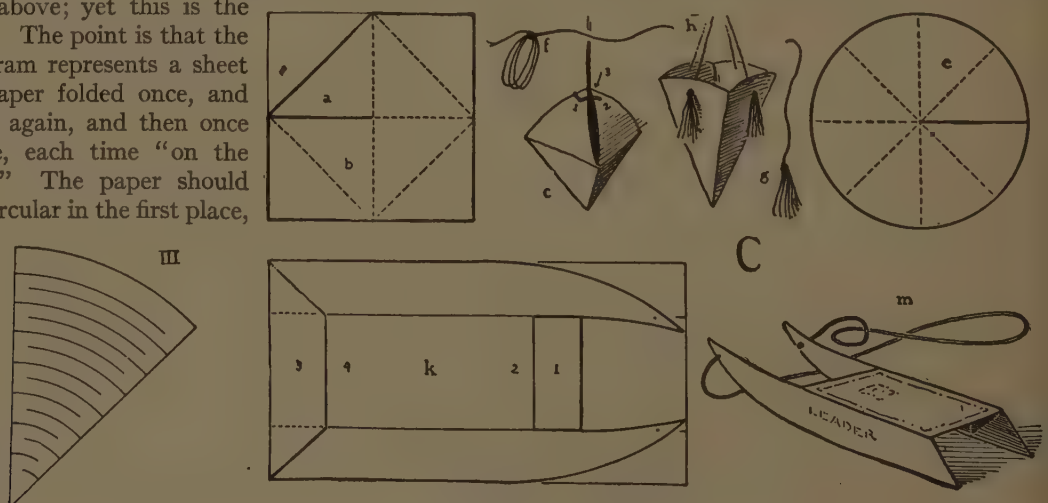


FOR THE CHRISTMAS TREE

It is hard to believe that a piece of paper looking like that in the small diagram below could open out into so elaborate a basket as the above; yet this is the case. The point is that the diagram represents a sheet of paper folded once, and then again, and then once more, each time "on the bias." The paper should be circular in the first place, or else the end should be cut in a curve after the folding is done. Then curved cuts should be made with the scissors, alternately from one side and from the other. The closer these cuts are together, the more delicate and also the more fragile the resulting basket will be. When the cuts have been made, open out the sheet fully, and smooth out the creases. Then put a small weight like a marble in the center and lift the outside edges gently and gradually, — and the basket is made. When May is here and the wildflowers begin to arrive in the meadows and by lazy brooks, fill some of these paper nets with blossoms and you will have a novel and beautiful form of May basket. When the basket is filled, the top may be gathered in with a ribbon or cord.

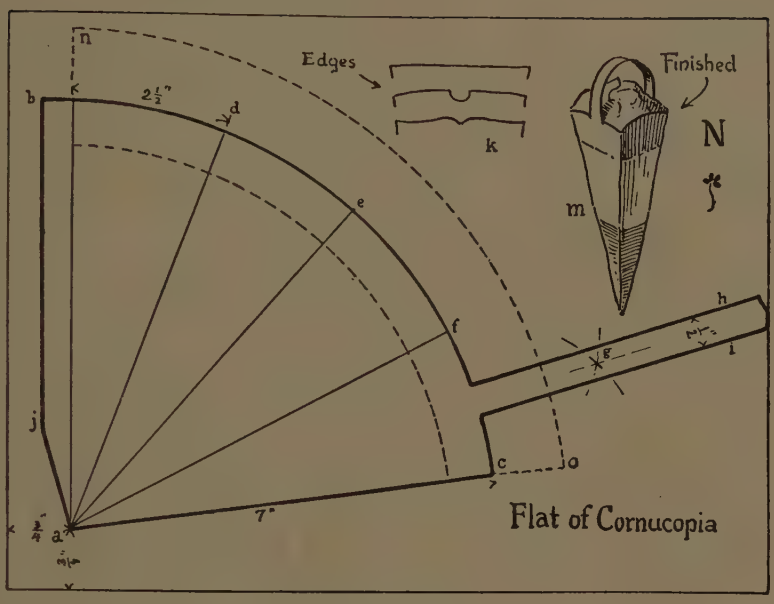
As an experiment try folding the sheet of paper as above directed, and then add one more fold, making four in all. Cut the folded sheet in the same way. When unfolded and opened out, the sheet will become a rounder and even more lace-like basket than the other. And by the way, if a marble or other weight is not easily obtainable, put a pin through the center of the sheet and on into any wood that will hold it. Then you can go ahead with the opening, gathering up the outside in one hand and helping the strands to come loose with the other.

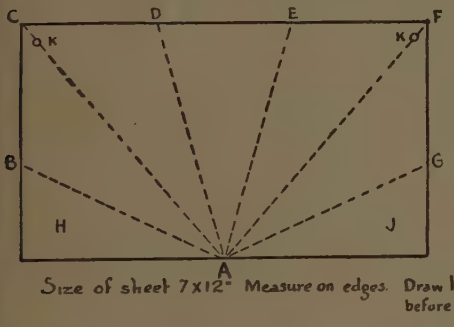
Other forms of paper basket are patterned below, and a sled, too, which might be made of cardboard, or even of wood, as a toy for your little brother or some little friend.

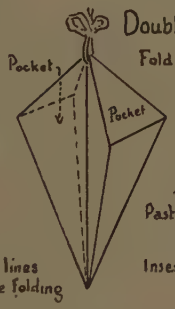


CANDY BAGS FOR CHRISTMAS, AND PAPER SLED

CORNUCOPIAS. You will remember that when Benjamin Franklin was a youngster he wanted to make shoes for his younger brothers and sisters; and that, to get a pattern for these shoes, he took an old pair apart. This plan may be followed with regard to all sorts of pasteboard boxes and cornucopias. Many candy boxes are shipped flat to the stores and are folded into shape by the clerk just as she is about to fill them. You could obtain some of these flats, as they are called, and use them as patterns. However, you will find on this and the following pages all the patterns that you probably will need; and you will have no trouble except that of enlarging them, which is not so great a trouble after all, if you measure and rule carefully.





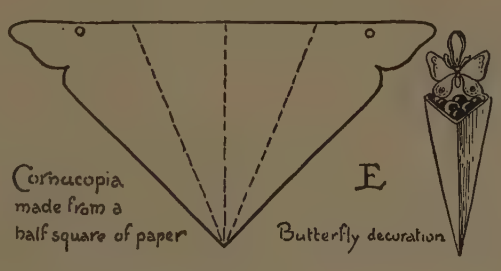


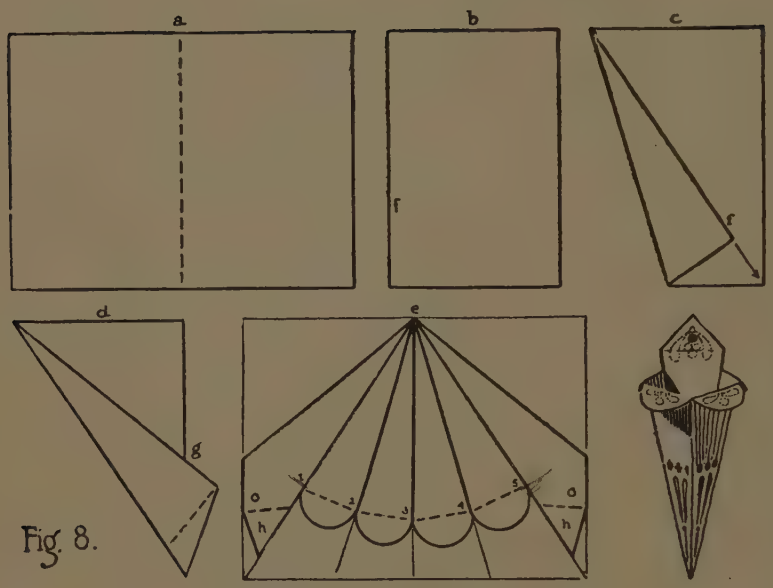
Double Cornucopia
Fold upward on AB
downward on AC
upward on AD
upward on AE
downward on AF
upward on AC
Paste upper side of H to underside of J
Insert ribbon at K

The best material for a cornucopia like that at the top of the page is what is called "oak tag," a very tough and durable kind of paper. Upon a sheet 9 by 12 inches make with ruler, pencil, and compasses a drawing like the large one in the illustration. The edges may be scalloped or notched as at *k* and the sides may be decorated as at *m*. In addition, tissue paper may be pasted on the "flat" as indicated by the dotted lines, to come on the inside of the cornucopia, and fold in over the candy.

Fold the paper over the edge of the ruler, or if the paper is too stiff, run a blunt knife-blade, like that of a table knife, along the ruler held to the folding lines, making the "score" or knife-mark on the outside of the bend. When properly scored, deeply enough yet not too deeply, even very stiff cardboard will bend evenly, and retain a good deal of its strength at the bend.

You will find it more fun to make a number of these cornucopias (and of the others for which patterns are given on this page) all at one time, doing the cutting for all, then the folding for all, and then the pasting for all at once. The painted decorations may be as gay and elaborate as you care to make them.





A CORNUCOPIA FOR CHRISTMAS CANDY

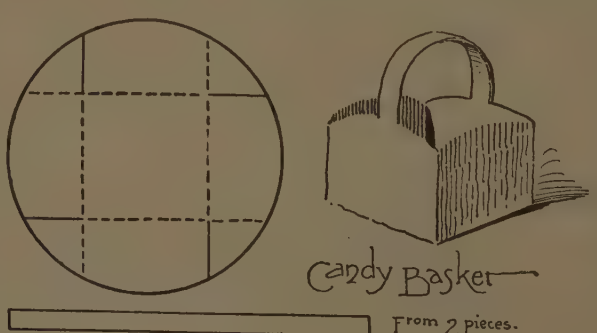
A novel and pretty form of CORNUCOPIA is here patterned. It is made from a sheet 9 by 12 inches in size, of heavy or light paper or cardboard, according to the use for which it is intended. Fold it first on dotted line *a*. Fold over the folded edge, *f*, so that it "aims for the corner" as shown in diagram *c*. Fold this part over again, on the line *f*, as in diagram *d*. Then cut off the corners of the sheet, *d*, *g*, and open it flat. On the creases radiating from *e*, mark off points 1 to 5, seven inches from *e*. Connect these points by straight lines as shown by the dotted lines in the drawing. Draw semicircles, or other curves in place of them, to make the ornamental fringe around the top. Then cut out the pattern along the heavy lines. Paste *o* and *o* together; fold over *h* and *h* and paste them securely.

The cornucopia in the illustration was decorated in water-color, the design being based on the mistletoe. This will suggest other possible designs for water-color ornamentation. It would be possible, also, to paste small paper silhouettes upon the sides and top instead of using paints. On page after page of this volume you can find designs and ideas for designs. But apart from all ornament, most attractive cornucopias may be made by simply using cardboard of lively and pleasing colors.

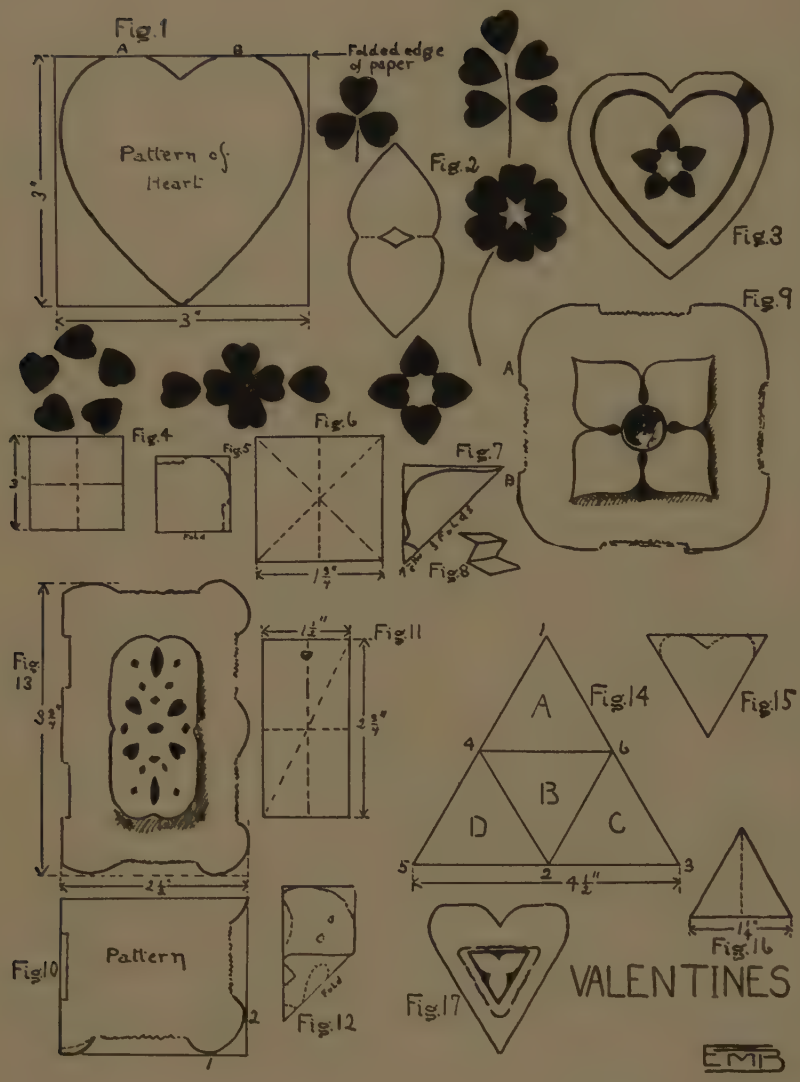
The pattern and picture of a very simple paper candy basket are given below. To make the basket, fold on the dotted lines and cut on the heavy lines. Then turn in and paste the extra laps at the corners. The handle is an additional piece, of any length desired. A good way to make this handle would be to take a strip of the right length, but four times too wide, and then fold it lengthwise until it is of the right width. With a knife you can now slit the ends for about an inch and a half, and then paste them upon the sides of the basket, half outside and half inside.

This box gives even more chances for decoration than those that have gone before. Leaves and flowers may be painted or pasted on; or geometrical designs may be used; or little gilt stars and other ornaments such as you can buy already gummed may be dotted over the surface.

When next you have an evening before you and do not know what to do, have a basket-making bee, and lay by a store of these charming little receptacles. They will be useful on every holiday; and they will be useful whenever you make a little gift of candy, for the basket ought to be just as genuinely home-made as the candy in it. When grapes are plentiful, a friend will appreciate a cluster all the more offered in such an attractive receptacle.

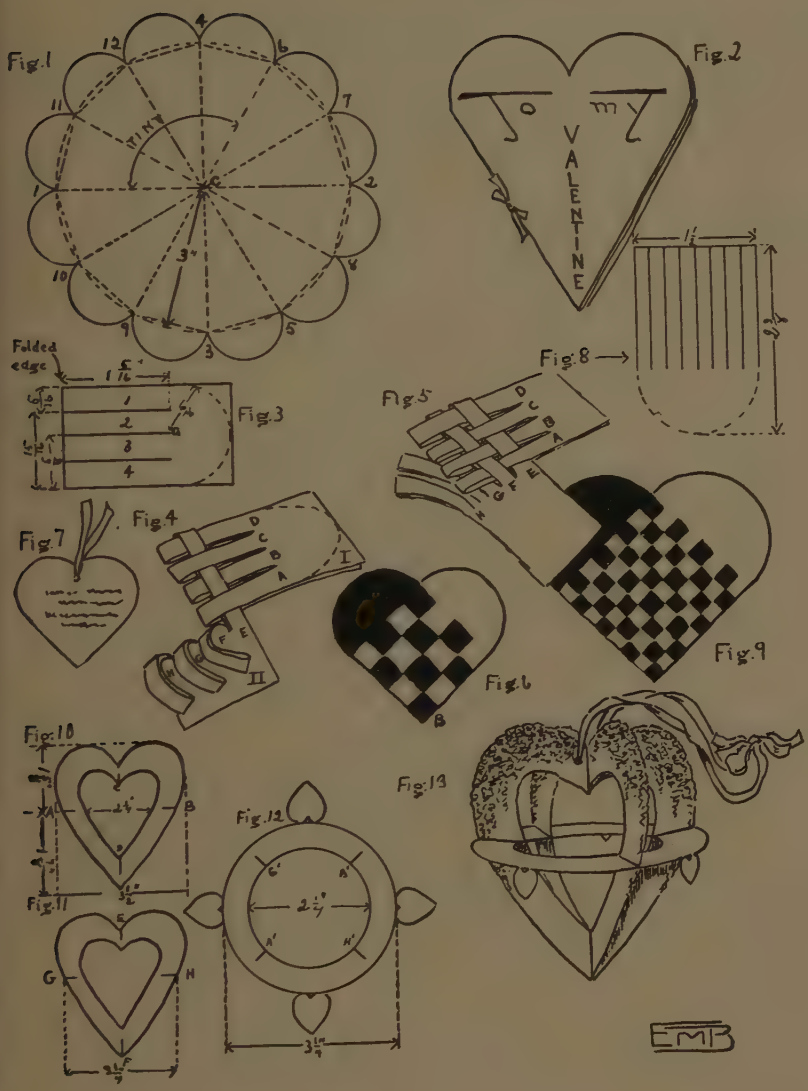


VALENTINES. When we hear a wise and prudent person objecting to the annual visit of St. Valentine to the schoolroom, we see again old King Canute in his royal chair on the beach talking to the German Ocean. When old Father Time omits the fourteenth of February, old St. Valentine may omit his festival. Nay, we must verily believe, in that event he would have it celebrated the next day! Valentines will continue to be. Our picture shows a few specimens of valentines of the more simple types, any one of which you can make, or, using one as a suggestive help, you can doubtless carry the idea farther, and produce something much finer. The first one is a double heart made from paper, and hand colored. The second, "A heart of gold, tremulous" (raised on paper springs), within which another heart appears, can be made by cutting out the larger of the two dark colored hearts and making the springs of paper just a little heavier, fluted or crimped, and pasted on. What a lovely combination it would make to cut out a series of these hearts, let us say five—one of the magical numbers — each one just fitting into the other, and each sitting on springs! Set the outer one, the largest one, on the longest springs, and grade the springs down in height to those for the little heart, which would thus in very truth nestle down into the actual "heart" of things. The color should be studied out carefully and each heart become a part of some lovely color harmony. The third valentine shown illustrates the pretty sentiment: "There's a home in my heart for you." The fourth needs no special comment. It is drawn on cream paper, painted in water color, and mounted on a blue-gray ground. The fifth was made by cutting various elements from paper and pasting them on a heart-shaped background. In the sixth, the two leaves unfold, revealing the harrowing statement: "My heart is broken as you see, all on account of love for thee." In the seventh a square is pierced on the diameters, the corners are folded back, and caught with four-leaf clovers for good luck, revealing the orange-colored heart within flaming with good-will. There is no more wholesome outlet for the natural romance that bubbles up in you and me than the valentine. It is nothing to be ashamed of.



MORE VALENTINES. These are suited to the ability of little people as well as the older ones. Let us try Fig. 1. You will need a piece of cream or white drawing paper folded about 3″ x 6″ in the center of the long sides, forming a 3″ square. Cut out a pattern of a heart and lay it on the folded paper as at Fig. 1, so that a little of the pattern-heart will be above the top of the paper. Then trace around the pattern and cut on the pencil lines. It will unfold as a double heart, hinged together as in Fig. 2. You can buy little seals like the dark heart-shapes shown near Fig. 4, and stick them on in patterns, as shown. See what a perfect rose with its leaves they will make! And above Fig. 2 is a shamrock. On the finished VALENTINE at the right is another flower form. One big heart of shiny red paper might be pasted on with a center of small gilt hearts, and a border drawn in colored crayon around the whole. Have the colors harmonize.

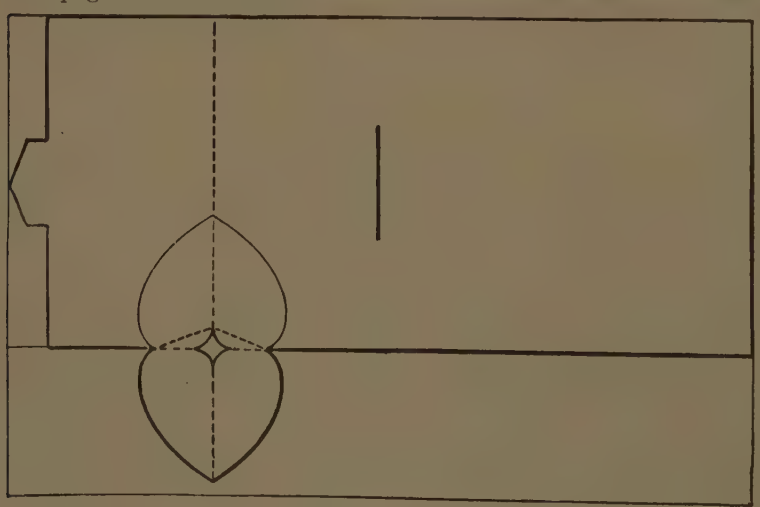
Figures 4 to 9 show the steps necessary for making Fig. 9. To save space, all the six drawings are not to the same scale. Fold the square on its two diameters, as Fig. 4, and cut out the shape like Fig. 5, or any shape you choose. It will unfold like Fig. 9. To make the inner flower with the dark center, cut another folded square, Fig. 6, in shape like Fig. 7, and unfold and mount this on paper springs as shown at Fig. 8. Before you mount it, paste a round gilt paper seal on the larger part, right under where the center of the flower will come. It will show through the flower form as at Fig. 9. For the RECTANGULAR VALENTINE, Fig. 10 is the pattern. Its left-hand lines are straight, to match that side of the foundation. Cut pattern paper $2\frac{1}{2}''$ x $3\frac{3}{4}''$, fold once, draw and cut, as at 10. Cut foundation paper $3\frac{3}{4}''$ x $5''$. It will fold once to half that, $2\frac{1}{2}''$ x $3\frac{3}{4}''$. Unfold and paste to it the pattern. The foundation fold is at the left. For the central design, fold as at Fig. 11, and cut as folded again at 12. Mount on springs as at Fig. 13.



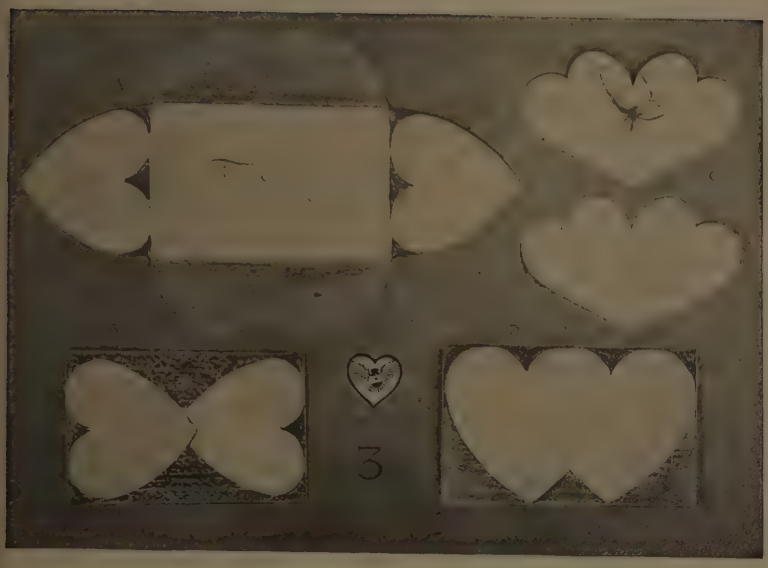
A WOVEN VALENTINE for those a little older. Compasses are useful. Make the equilateral triangle by drawing its base, 5–3, and with 5 and 3 as centers and length 5–3 as radius, describe arcs to intersect at 1. Draw the sides. Find center of each side, 4, 6, and 2. Draw the inner triangle. See Fig. 14. Fold C over on to B, D on C, and A on D. Round top corners and cut notch in center as at 15. Do not unfold. Decorate with a triangle of colored paper folded and cut from pattern like Fig. 16, into the final shape shown at Fig. 17, or tint the triangle D some chosen color, and before folding A down over it, crease A down its own center, and cut out (double, while folded) a little heart through which the color of D will show when A is folded down. Verses may be written inside the folded triangles. The HEART-SHAPED VALENTINE. With your compass describe faintly a 6″ circle. From each end of its horizontal and vertical diameters, 1–2–3–4, with a 3″ radius, set off points 11, 12, 6, 7, 8, 5, 9, and 10. Connect with straight dotted lines, and make all lines very light. Mark center C. Bisect 4–6, and from center, with radius one-half of 4–6, describe the semicircle scallop, repeating at each pair of points. Tint the area so marked. Now crease towards you on line 12–5. Crease towards you lines 6–C and 1–C. Fold each over to meet crease 5–C. This will naturally force lines 9–C and 2–C to crease from you, inward. The folded circle will then look like Fig. 2. Cut open on the lines 6–C, 5–C, 1–C. Catch the back with a bow of the same or a contrasting color. Letter the front in carefully studied spacing. The inside leaves are for verses. Gilt paint may be used sparingly. For the WOVEN VALENTINE, gilt and cream or silver and white paper are beautiful and dainty combinations.

The diagrams explain themselves. Two sizes are shown. Fig. 7 slips inside, and carries the verse. In the TWO-HEART VALENTINE the picture again tells the whole story. This is an odd but very pretty result of the cutting and folding of paper.

More valentines. The ideas embodied in this group of valentines, all made by school children, suggest how great is the field for this delightful form of design. Number 1 shows the outside and inside of a folio, one above the other. Number 2 is a beautiful design that can either be painted or stenciled on, or cut out and left as a perforated cover for an inner leaf of colored glossy paper. If so it should be the front of a folio holding a few leaves for the verses. This design is from the heartsease. Number 3 holds a verse leaf which says: "Your Heart is Mine." "Hearts are Trumps and you're My Ace" is the message carried by Number 5. Number 4 explains that ancient saying which it quotes. Number 6 is the work of one who is determined that certain words shall not be misunderstood. Note the button and the "beau." The valentine shown at the bottom of this page is one which is



very amusing and surprising. It folds on the vertical dotted line that extends out through the heart, and draws the heart inside. That part to the right of the slit through which the tab passes in closing the envelope is meant to contain the message of tender regard, and folds inward, before closing. "Since time and space declare I may not meet you, I send my love and wishes thus to greet you"—is a good message.

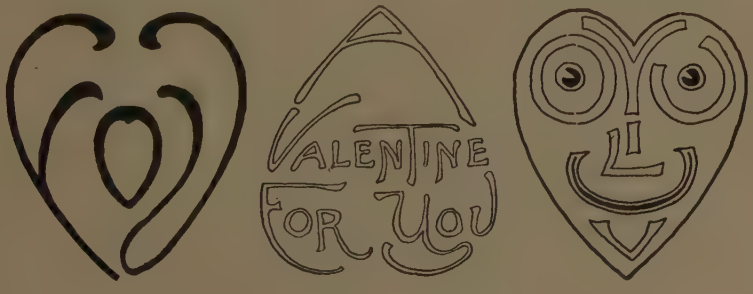


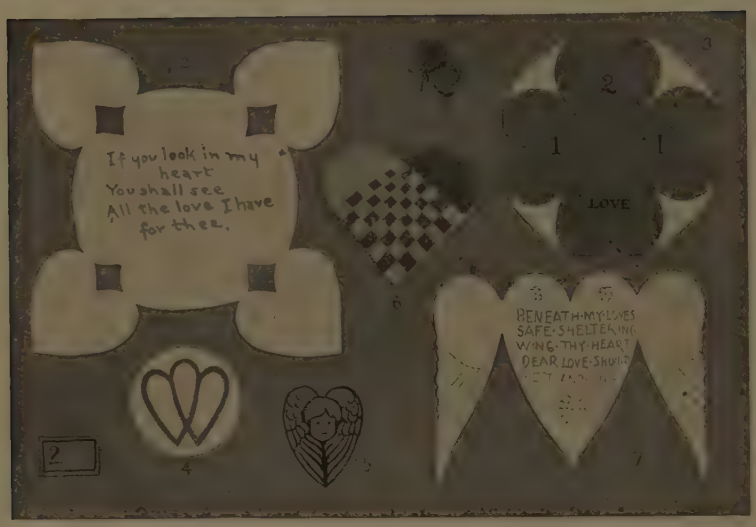
HEART-SHAPED VALENTINES. And surely a most appropriate shape. The design shown at the upper left is an envelope, A, of white paper colored as indicated, which folds into B, opening at the end. The two hearts side by side, lower right hand, form the lap of a similar envelope, opening at the side. The little folding heart, C, contains the clever suggestion: "Two souls with but a single love, Two hearts that read as one"— arranged as a couplet. The ancient form of heart-symbol for valentines was the two hearts pierced with the arrow of Cupid. One heart usually bled a little,— just two or three scarlet drops, — to show the delicious agony that Diccon was enduring for his Janice. The flowers furnished other symbols of the day, the crocus, the daffodil, the yellow tulip, and the pussy-willow. The homing pigeon with the letter slung to him by bright ribbon was another gentle suggestion of the soft and tender passion that we all have felt. What an exquisite little thing is the captive heart fancy, with the throbbing members hopelessly caught by the circle — symbol of the endlessness of their love—and the chain and the cross, sign of that faith which should purify all love. This could be carried on into endless paths of pleasure in the designing. The materials of handicraft, leather, metal, — what beautiful things could be made of this idea by the expert craftsman!

But whether made thus or simply painted upon a foundation of a color gently contrasting with that of the hearts and chain, it is an unusually good idea. The humorous side of valentine designing appears in the illustration at the bottom of this page. The lines of the design at the left offer a hint of what can be developed from them. Note the heart-shape of the whole. The middle one explains itself. That to the right, its eyes plainly feasting on your attractions, says, in not the best English, "You I Luv." But then, language changes every year.

It is great fun hunting out the best kind of verses for valentines. Here is a good one:

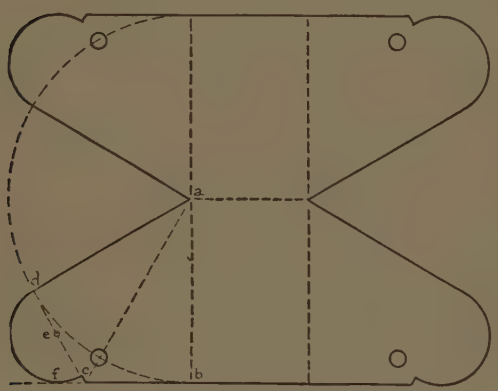
"I wish for you a life of gladness
Full of love and free from pain;
A life of goodness free from sadness,
Bright as sunshine after rain."





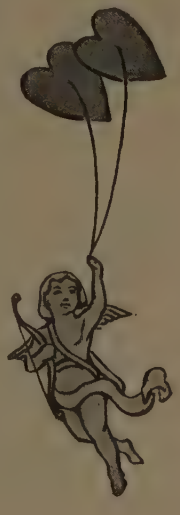
A VALENTINE BUTTERFLY and a few other kinds. The little butterfly has hearts for wings, and it contains this sentiment: "Two hearts to happiness can fly, While one alone were like to die!" printed as a couplet. In Number 2 we have an interesting though simple problem in which you can apply your knowledge of paper cutting. It is a circle cut from paper folded square each way, which brings four thicknesses together so that the hearts can all be cut at once. When made of paper colored on one side it folds up to look as shown at 3. Figs. 4 and 5 are covers of leaves of the same shape, bearing verses of tender regard sacred to St. Valentine's season. Fig. 6 is woven like a May basket, and so will hold the loving message concealed. Fig. 7 is a pretty conceit; when the wings are folded over the heart they still appear to be wings, for the other side of each is like the side now visible. And what could be sweeter than the verse they carry?

The CHAIN OF HEARTS opens a wide doorway to many possibilities. At A is shown the cardboard pattern for a link. These are drawn double, like B, and are used by threading through each other and folding, forming the chain as seen at the left. Separate links may be used to form many beautiful units, as for instance the "good luck flower" at the lowest right. The pieces cut from the links, as shown in the fourth down on the right, may be used to make another form of that flower, like D, next below; or like the rose of hearts, at the upper right. A VALENTINE BASKET. Start at point *a*. For the angles use the radius of the circle as in making the hexagon. Or, use a 30-degree and 60-degree triangle. The center, *e*, is located so that the arc *d–f–c* comes tangent to the extended straight edge of the paper. Cut, fold, and paste the hearts together. The handle may be a paper or ribbon.



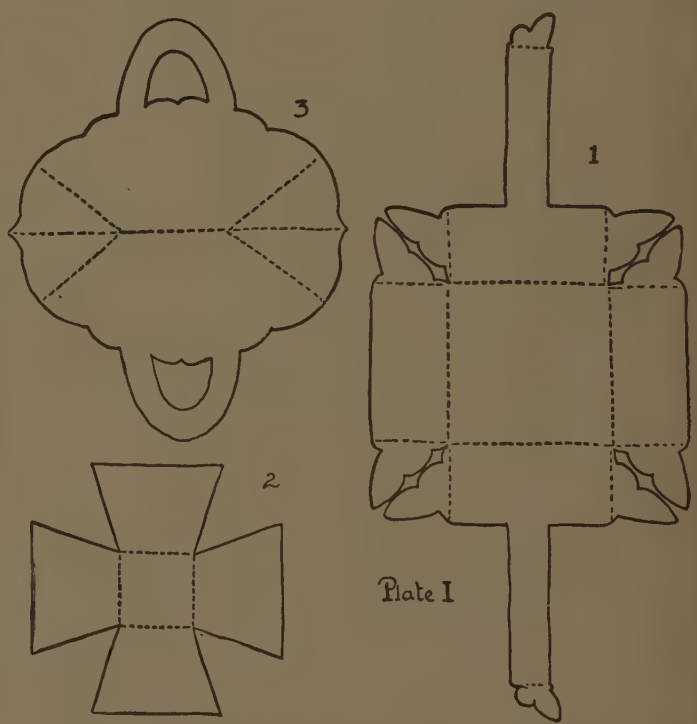
A Valentine Basket

Miscellaneous valentines. Fig. 1 is a love letter made from white paper 6″ square. Fig. 2 is a heart with its message. Cut from white paper 4″ × 4″. Make envelope half the size of Fig. 1. Cut the little squares ¾″ on a side. Paint red the edges of heart, the lap, and the squares. On the squares print letters so they can be arranged to spell "I love you," put cards in the envelope, and paste envelope to the heart. On back of heart write, "If you can read my message well, Then you'll know I love you well." Fig. 3 is a card with a water-color sketch of the sea and the quotation from Romeo and Juliet: "My bounty is as boundless as the sea," etc. Fig. 4 is first drawn out, the winged heart colored red, then the upper part cut away. Fig. 5 is a white snowflake design cut from white paper pasted upon blue. The blue paper is 4″ × 7″ folded on its short diameter, and the double hexagon cut to hinge on the left. For a verse write within: "The deep snow lies upon the ground, And flakes are falling all around, But somehow when my love I see, Like summer time it is to me." Fig. 6 is a triptych, cut from paper 5″ × 9″ so as to fold three times. The three hearts shown are to go on the inside of the left-hand cover, and should be repeated on the right hand with largest at bottom. Write this verse on the middle page: "If of me you cease to think, My heart will shrink and shrink and shrink; But if you love me tell me so, For then my heart will grow and grow." Fig. 7 is a bunch of violets painted in color, as if tied to a card, cut out, the stems tied with a real ribbon, and the address written on the card. On the back write your verse. A pretty idea would be to make the envelope for the dove separate, and hang it with a ribbon. Let the verse be: "I send you my love On the wings of a dove, This dear old Valentine's Day. You 'll never know who Sent this message to you Unless you send back the same way." The cherub with his St. Valentine kite is an idea that can be used in many ways.



PAPER BASKETS. Here is a group of baskets made of colored paper not too stiff for the smallest fingers to handle well, and the three shapes shown in the diagram explain the foundation idea, that of some simple unit like the square or oblong. Upon these forms as bases, the little folks can build, and it will be astonishing how fertile their little minds will often prove to be. There is nothing a child loves better about play than to cut out things, especially if they can be shaped into something like objects used by the grown-ups. To make a basket, a box, a pasted paper roll, a little house, or to cut out animals — greatest joy of all — usually keeps the small people not only busy, but in a healthy state of mind. The various paper stocks offer each a new pleasure in the manner in which it will fold, crinkle, or shine, according to its weight, pliability, or color. The basket shown at Fig. 1 is based upon the square, and in planning it you will find squared paper best for the children. Once get them started, and the rainy day in the nursery will lose its bugbears.

Any child that can count, can mark off the square in its simplicity, and then you can easily plan the harder parts, such as the sides of this Fig. 1 basket. When creased on the dotted lines, perhaps first making a light cut with a knife, you can fold up the sides to any angle you wish; it may be a box with vertical sides, with the two corner ornaments pasted tightly together, or with the corners of the straight parts caught with thread and the ornaments allowed to flare free. This last is shown in the basket on the extreme right of the pictured group. The same pattern might be brought together by the sides so that the ornaments would just lap each other, where they would be caught with thread, the result being a basket with flaring sides. Several of the baskets shown were drawn upon dotted paper, which to some children is more attractive to work on than the squared. Diagram 2 shows a basket built on a foundation of a Maltese cross, the dotted square forming the bottom, and the flare of the sides making it impossible to develop any but a tray-shaped basket. Fig. 3 may either be creased, or cut and lapped.

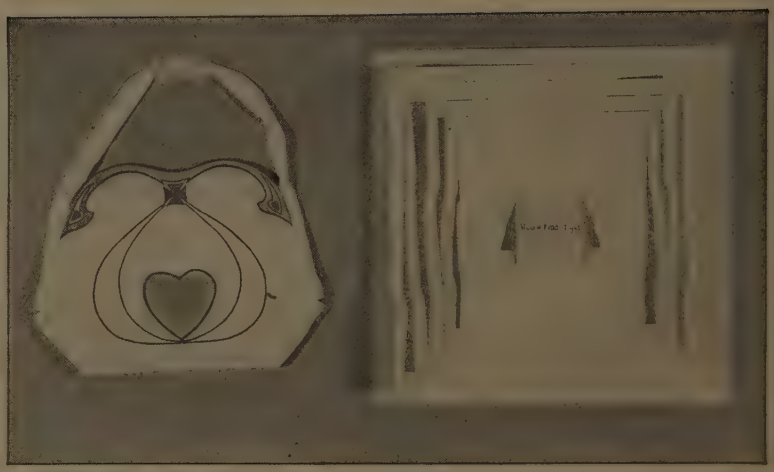


Always remember that the uses of an object must be thought about. For instance, in the case of basket No. 1, if it were to be made a real basket for carrying things, you should be certain that the corners would not spill out the contents.

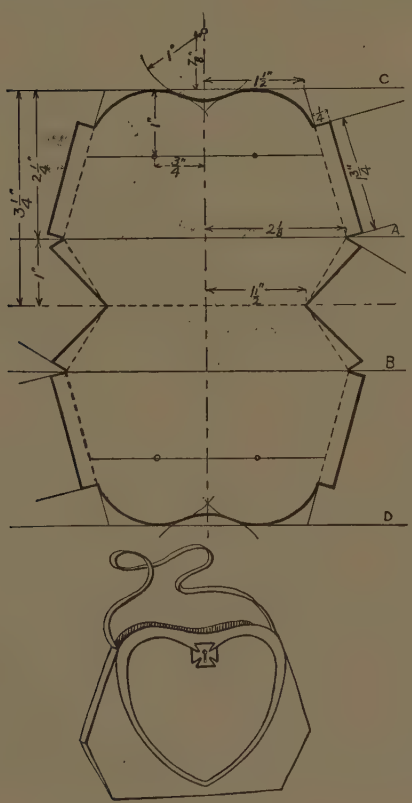
MORE BEAUTIFUL VALENTINES, and you can interpret this caption in either of its meanings, more of them, or that these are more beautiful than any shown before. Either one is certainly true. That at the upper left hand, the two interlaced hearts within the circle — emblem of eternity of love — was found upon an old carved Bavarian marriage cabinet of the XIIIth century, now in the national museum at Munich. It might be applied to valentines in an infinite variety of ways. One would be effective wherein the inner circle of full red, bearing the two hearts, was cut out and pasted on a white paper, while the red folio cover was pierced with the larger circle, thus revealing the inner one. The two chained hearts again appear in larger form than on a former page, and it may here be added that the Maltese form of the cross is the special symbol of knightly devotion. The upper right-hand design you must surely execute in cut-out work.

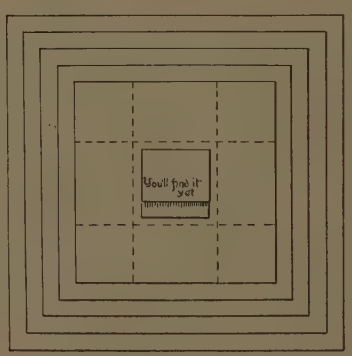
The heart can be cut from tough white paper and the very dark parts pierced and cut out so as to show when it is mounted on a red foundation or a folio cover for verses.

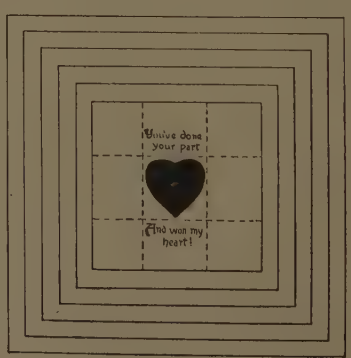
The fourth design is a clever use of the plaid pattern, drawn on tracing paper. The dark square is the front part of the folio cover, with the plaid painted and cut out as shown. Transparent tracing paper is underneath it, on which, so as to come just against the heart beneath, the name is lettered in white. The heart, of dark red, is pasted on an inside leaf, on which is also printed the old Scottish song, "O, wert thou in the cauld blast, on yonder lea, My laidie to the angry airt, wad shelter thee, wad shelter thee." A beautiful variation of this theme would be to substitute a stenciled rose for the red heart, and use the words of that other Scottish rhapsody, "O, ma luve's like a red, red rose, that's newly sprung in June, O, my luve is like the melodie, that's sweetly played in tune." Nor need it be confined to Scottish song; Irish bards have given us some of the sweetest love songs of our age. Of these, the beautiful verse written by Thomas Moore beginning, "Believe me, if all those endearing young charms," is one of the best known.



CUPID'S HAND BAG AND CONTENTS. These two designs offer a delightful scope for the powers of eye and hand. The bag is made of white paper, and the flat should be 6″ × 9″, according to the dimensions given in the diagram. It is best worked out from the center line. The handle is made of either ribbon or paper. Two designs are shown. These are pasted upon the bag, with some support in the way of drawing. The many squares one upon another form something you will enjoy more than anything you have yet made, a MYSTERY PACKET. It holds a heart "seven times folded in mystery." All the squares are made of rather thin paper and the relative sizes are shown in the diagrams and the illustration. These are fastened together by a little paste in the center of each. They are what is known as concentric squares, because they all have a common center. Upon the smallest one inside, the heart is drawn, and the accompanying words neatly printed. The papers are folded as indicated by the dotted lines, first the two sides, then the bottom, then the top. They are then lettered as indicated in the right-hand diagrams. Beginning with the outside wrapper, the lettering is as follows: 1. "Just look within." 2. "Keep on and win." 3. "Another try." 4. "You'll soon see why." 5. "'T won't do to fret." 6. "You'll find it yet." And inside the last sheet, "You 've done your part and won my heart." Here are a few other couplets: "If you will be my valentine, You'll find no truer love than mine." "Little friend, I love you true, Here's a valentine for you." "Mother dear, I love you true, Here's a valentine for you." Or thus: "Hours fly, flowers die, New days, new ways pass by. Love stays."

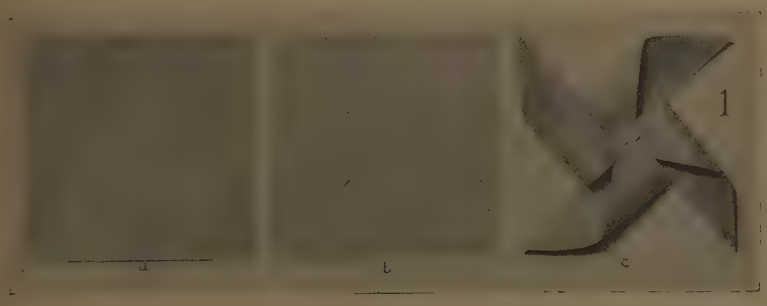


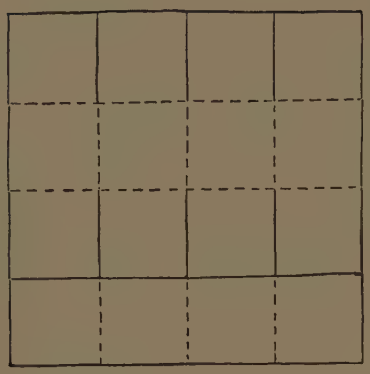




HOLIDAY SYMBOLS — ARBOR DAY. Your little people will want to have a part in everything the family do. Arbor day offers not only a good chance for those very busy folk of ages five to seven to help set out shrubs — and how they will tug at a water pail with its tremendous quart weight — but it also suggests new delights in symbolic paper-cutting. Some such are embodied in this page of designs. In the round badge, "1907," be careful and cut the inner circle in sections, as it holds the design to the whole card. What a delight to draw, fold, and develop the little park with trees, shown at the bottom of the page! How those chubby fingers will toil with the scissors hour after hour, producing avenues of shade trees like the five just above the park pattern! The designs appeal to the older children, and some of these are beautifully simple, well suited to cover a program of school Arbor day work.

The wind is a merry playmate. He seems to say, "Where are your kites and windmills? Let me come into the game with you!" A simple WINDMILL can be made by your youngest in trousers by following the three steps shown in the lower illustration. This shape is very old, no one knows how old. Perhaps the swarthy children of Old Egypt used it along the Nile, or the little Ninevites playing by the banks of the Tigris.





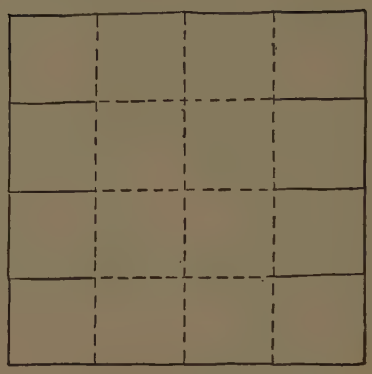
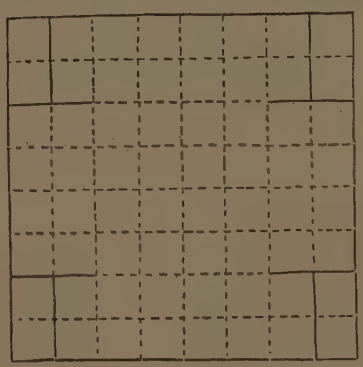


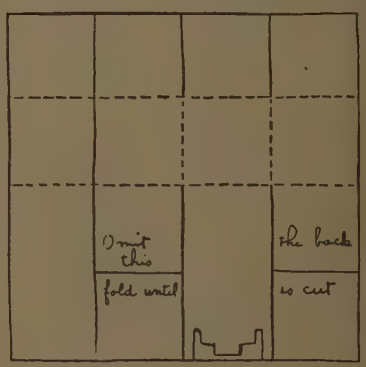
Fig. C.

Fig. D.

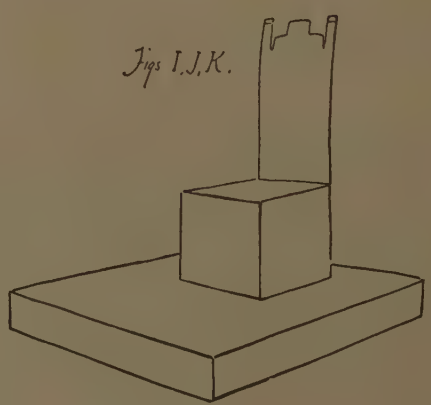
and your story begins. The whole thing can be worked out, scene after scene. Think of the Wolf peeking into the doorway to see if the coast is clear, while Red Riding Hood is seen coming through the forest at the back! The houses shown here are cut from the flats above them and folded. Windows and doorways should be marked on or cut out before making. Fig. D, the more elaborate, folds by lapping the two middle squares of each vertical outside row for the gables, and bringing the ends of the house to lap below them. Cut always on the full lines. Fold on the dotted lines. You will thus have a reliable rule to follow.

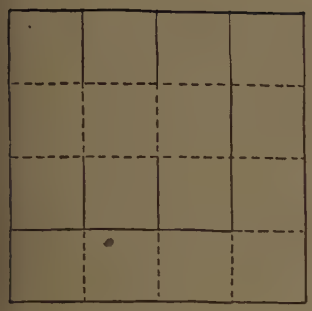
CUT PAPER HOUSES AND SCENES. When you had read your first Fairy Stories, a new world was opened, and it is to be hoped that you will never tire of its beautiful imagery. To help you remember it, you can make up in cut paper forms your old friends Red Riding Hood, Goldilocks, who had such a thrilling escape from the house of the Three Bears who lived in the Wood, and the Ugly Duckling; yes, and a host of others, in fact all your dear friends of Make-believe Land. Make a little inclosure like the back and sides of a theater stage, which any big brother will show you how to build, and within it you can place your houses, trees, people and animals. You can make little table dishes out of clay, and presto! your stage is set,





Figs I, J, K.





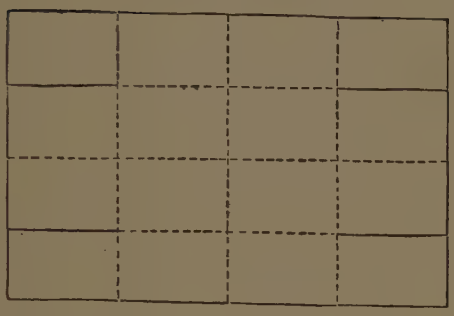
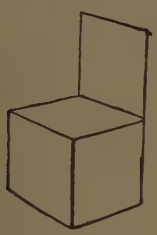
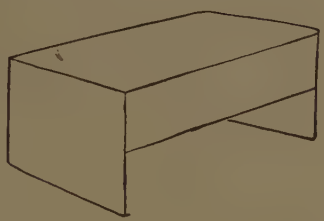
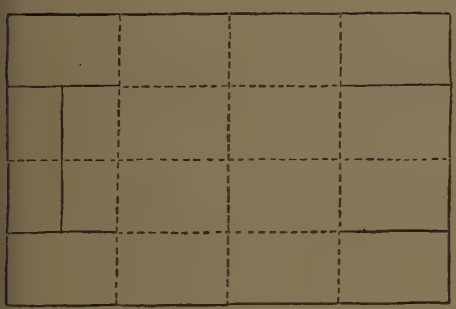


Fig. F

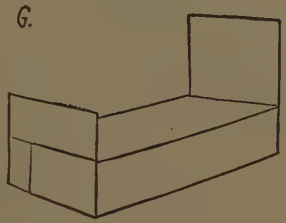
Fig. E





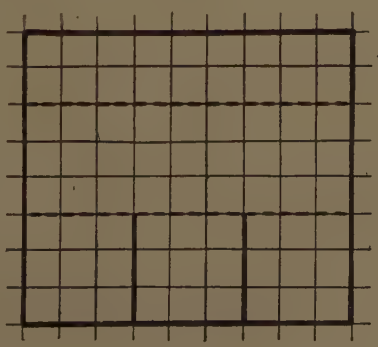


G.

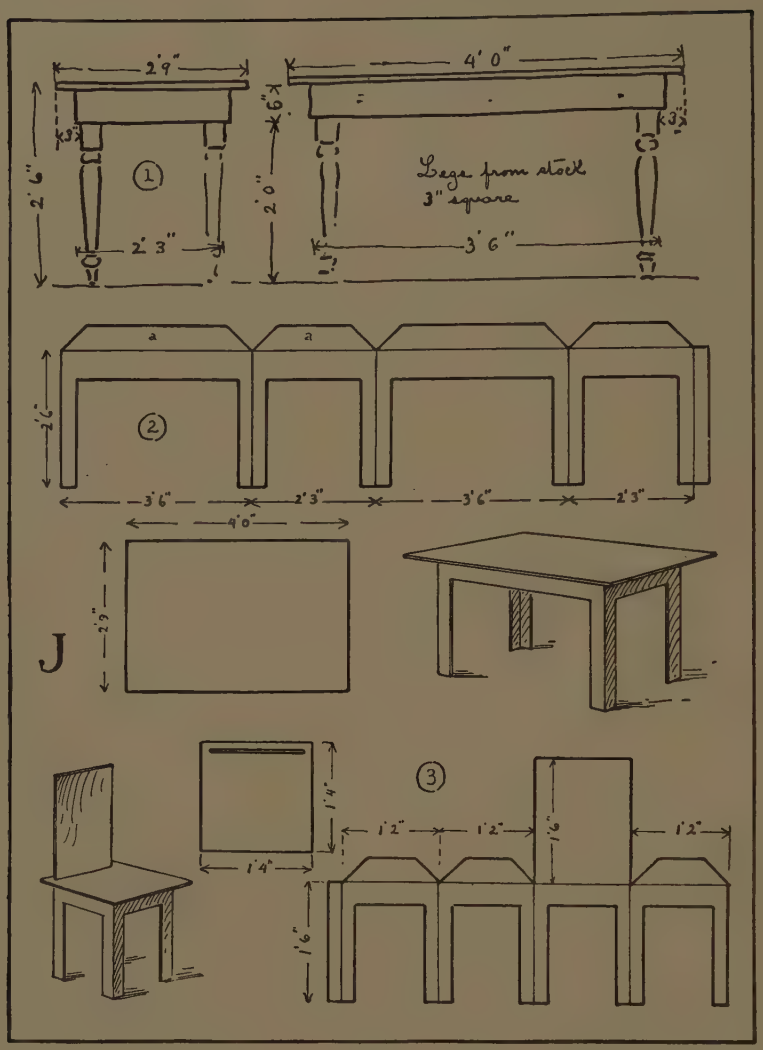


CUT PAPER FURNITURE. You will remember that when Red Riding Hood left her mother's house to go and visit Grannie, carrying some nice things to eat, there had to be a fireplace and a table, and of course some chairs; so there had to be in Grannie's house, too, perhaps like that shown on page 94. Well, let us begin with a chair. This is to be cut from a flat like Fig. E, which folds up nicely into the chair shown below it. The table is made from flat Fig. F, and what a broad, solid-looking thing it makes, to be sure! Lastly comes the bed, shown both in flat and completed at the bottom of this diagram. You can cut out the center of the chair-back so as to make it more natural if you like, but as the bed cannot be cut out very much, nor the table, it is better to have them all as near alike as you can. This is one of the first things we have to learn in good design. We call it unity. It means, things alike in style.

A PAPER CAP. This is such a covering as the little girls of Puritan days wore on their heads, and it is easily made by following the lines of the diagram for the flat shown at the left of the little girl. First fold down on the upper dotted line. Next cut on the full lines and bring together and lap the two outside lower squares, pasting them securely. But this is useful in a more practical way, for it may be made large enough to be the pattern for such a cap to be worn by yourself. It can be made as described in a very small size and used on a doll. Or it may be made for a paper doll without the square cut in for the back; simply fold it for the front "frill" and crease once the other way to slip down over the head of one of the paper folk to appear on the mimic stage.

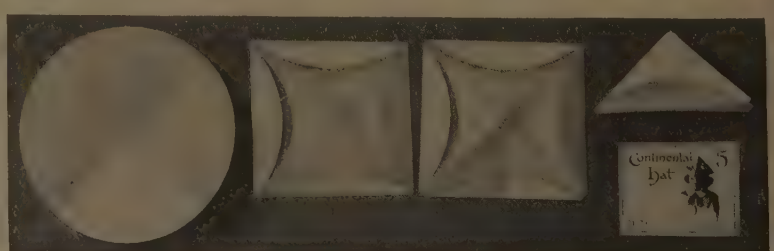


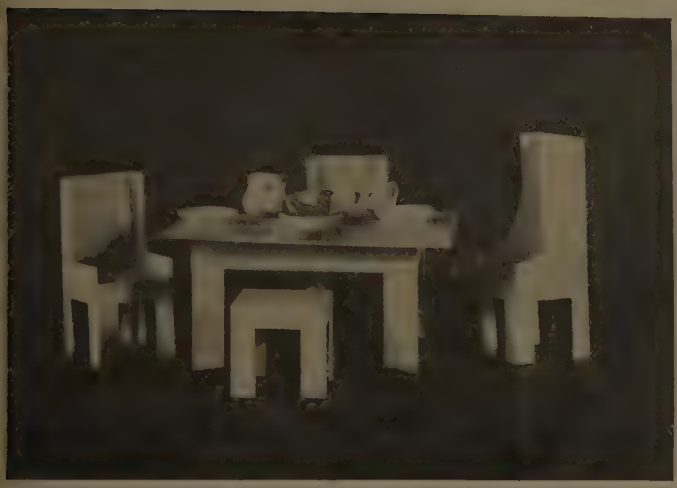
A



a sheet of thick manila paper or oak tag, draw to scale, perhaps a half-inch to the foot, the flat for the legs and braces as shown at Fig. 2, adding the laps *aa*. Thicken the legs as may seem necessary, but keep the correct proportion of width to height in both end view and side view. Now score the long horizontal line and the verticals for the corners of the legs, cut out the flat, fold it into shape, and paste the leg. Next make the top of correct proportion and paste in position, allowing a reasonable overhang. What a clever idea is that of THE CHAIR! It is made somewhat like the table, but after cutting out and pasting the legs and seat-frame, you must cut the seat large enough to lap over (mostly at front and sides) and cut the slit in it to fit down over the chair back. Paste into position and the chair is complete. The back may now be bent or curved backwards a little. THE CONTINENTAL HAT is easily made by following the folds as shown, and catching one folded triangle into the other by one of the tabs. Such a hat should have a cockade, made by folding a small oblong into two squares. Cut this into an hour-glass shape, crimp while still folded, unfold, and paste on the hat.

ANOTHER PAPER TABLE. This one is of a more carefully studied pattern. It more nearly resembles a table built of wood. Take some real table as a model. Make a rough sketch of the end view and the side view to show the proportions, the top showing as a single line and the legs merely squared sticks, such as the table legs were before they were turned or worked. Upon these sketches mark the dimensions, as shown on the upper diagram of J. Now, upon

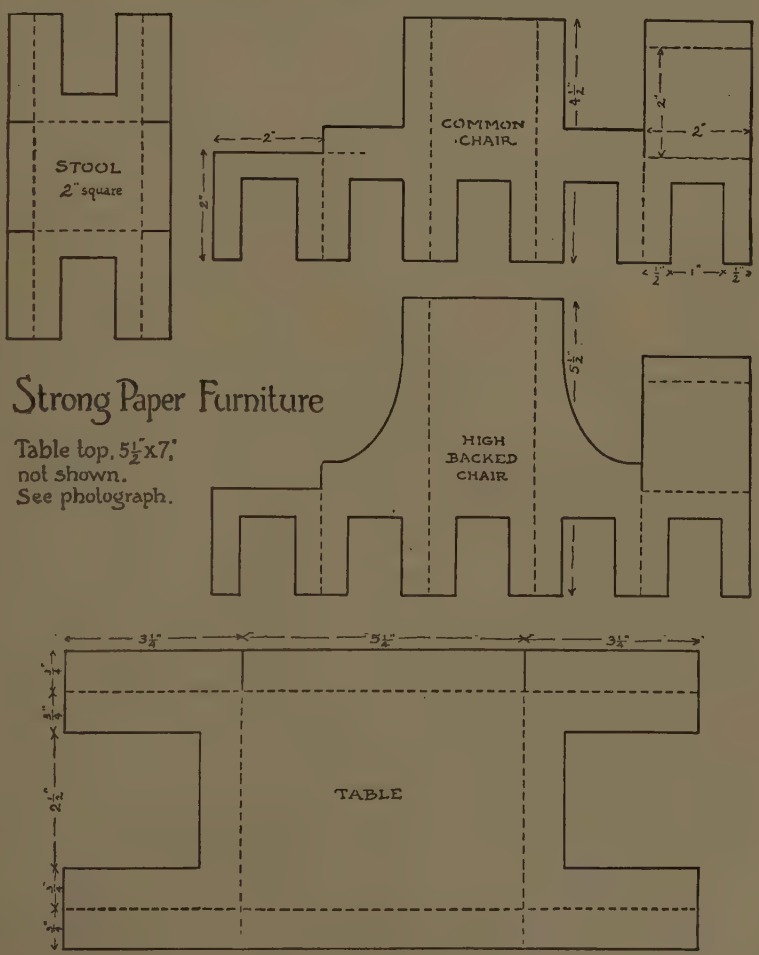




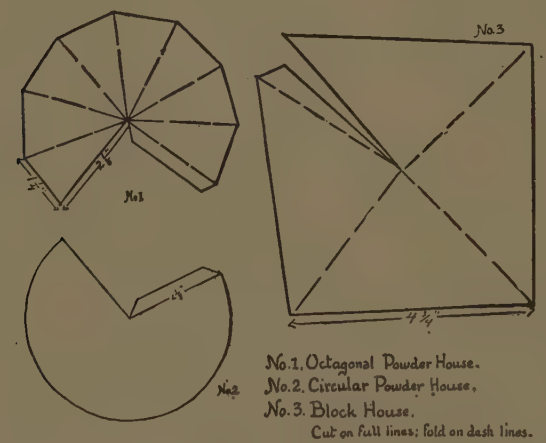
STRONG PAPER FURNITURE. Here we have a cozy, inviting tea table (or is it set for breakfast?). In any event, it must seem very attractive to the great tribe of doll-boys and doll-girls. In one of the oldest houses in America, the John Ward house, in the yard of the Essex Institute at Salem, Mass., there is set a table for breakfast of which this little group would remind you, if you had seen the real table in that famous old house. That table is set for a family supposed to have lived in the years about 1690, and the simple furnishings and sturdy furniture are very like these small ones in the spirit of their design.

The flat shown here illustrates the way to plan and build this furniture. The common chair has the seat cut in one piece with the legs at the right, which come on the front when the chair is cut and pasted. This seat piece is dotted to fold downward a short way down from the top (upper right hand), and paste against the back of the chair. The front is planned to come out double, making it stronger.

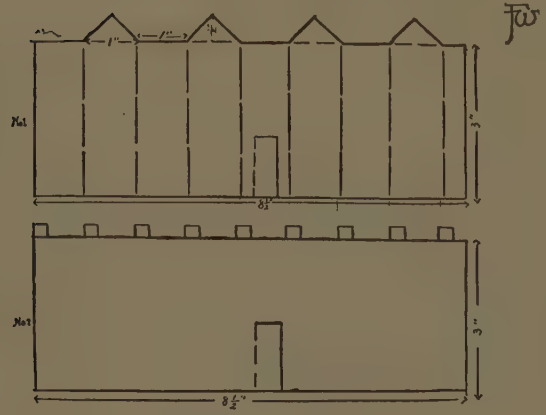
Extra paper is allowed for arms. In the high-backed chair, these arms curve gradually outward from the back. The little stool without a back is very like those on which children sat in our colonial days. The table flat shows a top that is entire. On this paste another, which will overhang properly. The dishes for the meal can be made from clay, and so can the fowl and the Indian bannocks, and other old-time food.



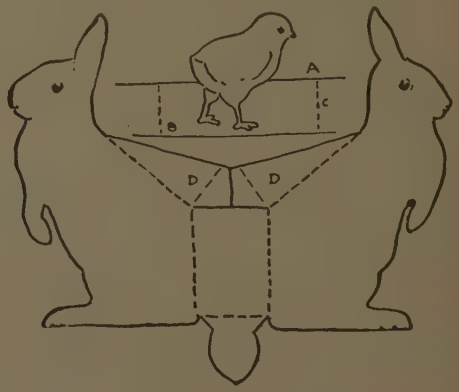
MORE REAL THINGS FROM PAPER. This Powder House, such as our ancestors used for storing the town supply of powder, is easily made if planned like the flat shown, and when set up with the combination of a sand table and blackboard, can be made very real. A flexible rolling blackboard does not cost much, and soon pays its way in fun. All back of the sand, with its house, and trees made from cedar twigs, is drawn on the board with chalk and charcoal, more or less faintly put on to express the light and shade. Moss, stones, gravel and twigs can be made to express a very lifelike countryside.

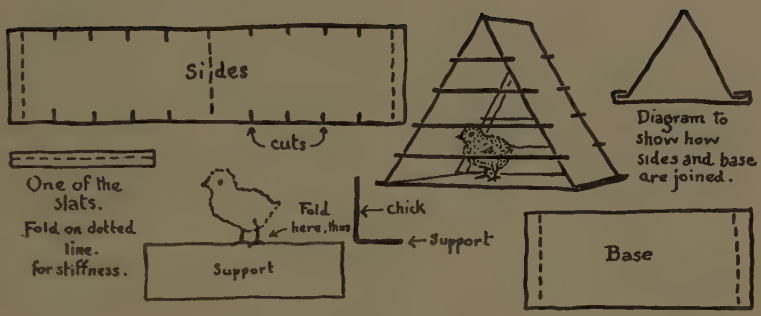


No.1. Octagonal Powder House.
No.2. Circular Powder House.
No.3. Block House.
Cut on full lines; fold on dash lines.

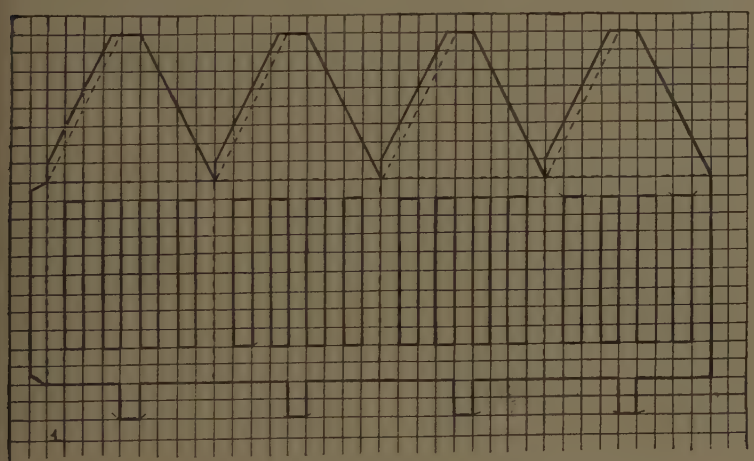


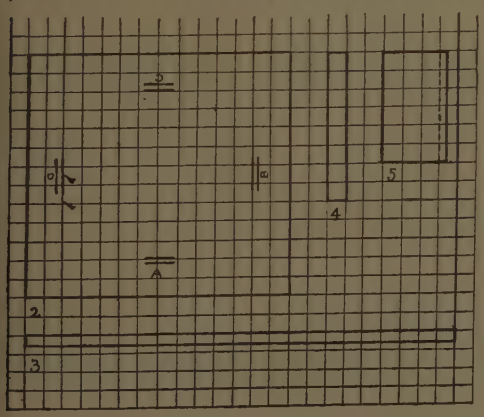
A CHICKEN AND A BUNNY. From copies furnished at any art store, little children can usually draw very well such animals as they best love, and these can be made to stand erect by bending the bases as at B and C. The two-sided bunny is a fascinating problem for you older ones. The drawing shows the right and left sides. The ears and paws should not be exact duplicates, so that, when bent together, you will see two ears and two paws. The heads should be pasted together and the laps, D, cut and folded and likewise pasted. Turn up his tail, and your bunny will prove to be a very lifelike fellow. As all rabbits are not alike, would not a spotted one be interesting?





AN INFANT POULTRY FARM. This paper chick and his coop are very true to life as shown here and as you can make them yourself. The coop is the first thing to make. For stock, use the oak tag or an equally firm white bristol board. Note that the whole group can be made and put together without paste. This is especially fortunate in the case of the sides and base of the coop, for then, do you not see, you can remove the base in order to take out the chick and give him a snuff-bath for whatever may ail him. (On older fowl this is good for hen-lice.) The slats at front and back are each a long strip, folded once in the middle and thrust into the slits cut in the sides of the roof. But this is only a summer house, and Chickie would doubtless be warmer in the fall if the coop had a back. See if you cannot plan a back that will take off when desirable. And of course you need not stop at a chicken. There are the pullets, those dear little half-grown hen-maidens, so pretty and sleek and shy. They would not be too large for such a coop. And then there might be one good old mother-hen, with lots of the little chicks that are so cunning. How they will wander round the coop-yard busy at their baby feedings until of a sudden Mother-hen says, "Cl'k!" and they all scurry into the house to safety.





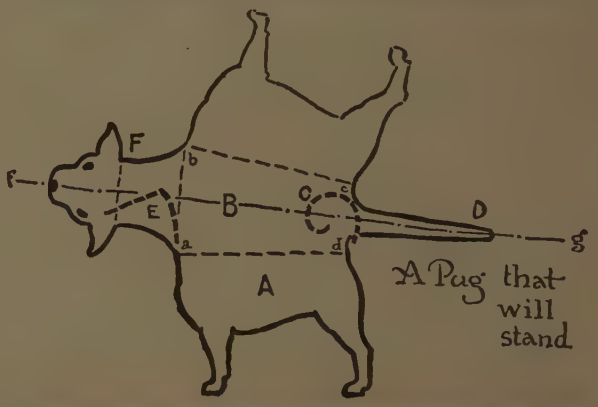
A Bird in a Cage

Second graders can hardly wait for materials to begin one.

MEB

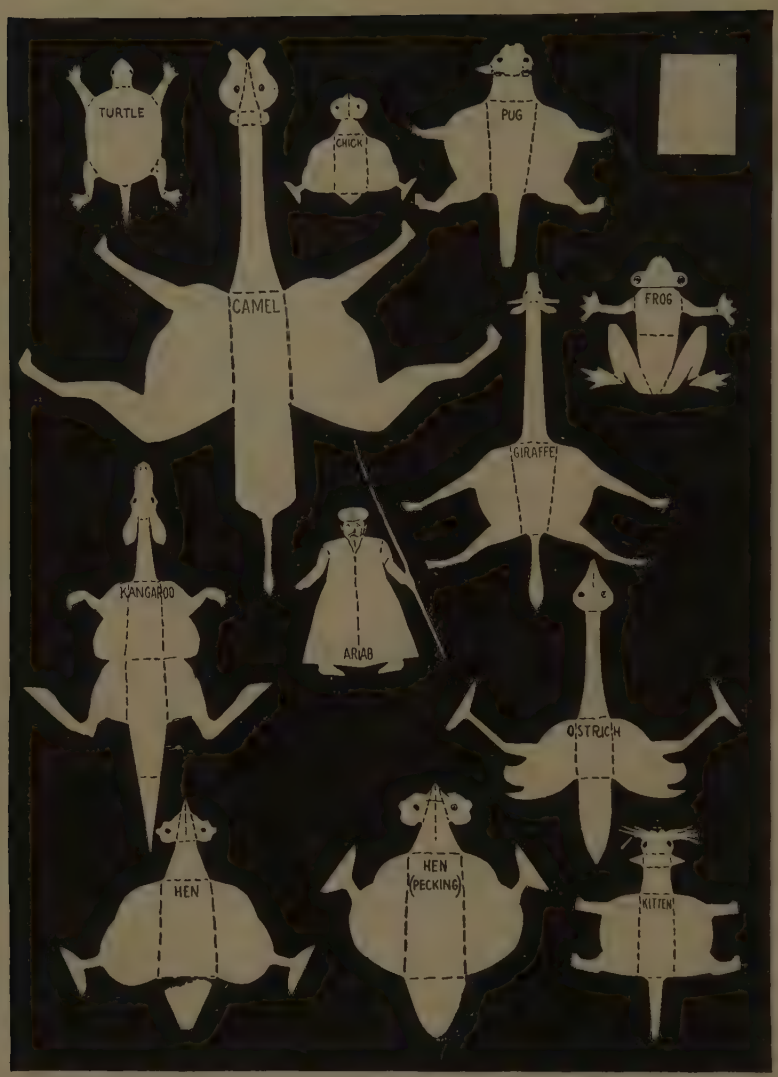
A BIRD IN A CAGE. This feathered friend of the air, reduced to painted paper form, has been described in another chapter, together with his "gilded prison." Using squared paper, no directions are needed for making. Number 2 is the base, 3 the perch, 5 the perch support, and 4 the ring to hang the cage by. Paste the bird to the perch, draw the tabs of the sides down through the four slits in the base, and the bird is prettily housed. There is no surer way to learn the birds or anything else in variety than to draw them. What an instructive flock you and your friends could make! Robin, sparrow, blue jay, brown thrush, — think of it!

PAPER ANIMALS THAT ARE COMICALLY LIFELIKE. These are at once an instructive joke and a lesson in anatomy; very real to Little Brother and Sister, both realistic and educative to you who are older. This way of making animals results in postures that now and then are startling in their fidelity to nature. And one may think of that rather expressive bit of slang, "they're more fun than a goat"; why not include the goat among them? Well, try him. On this page are shown at the top, an ostrich, a pug dog, a kitten, and a hound. Each one shows some lifelike characteristic or "point," as they say at the dog-shows. Below the diagram for the flat of the pug dog (which we will consider later on) is a jolly barnyard in miniature. Here is a biddy pecking away in her demure yet important fashion; a turkey cock swelling with gobbling pride; another sedate hen, a pullet, a shanghai rooster, and a duck. Below is a turtle, apparently jumping for joy, and a frog humped up ready to leap. All are simple to make, only you have to think of the thickness as well as the height and width. But let's to our pug dog. He is thicker at the shoulders than at the hind quarters, the opposite of a horse. We will draw one side, as A, and think out the top, like B. Then establish a center line, *f–g*, and next think of where the tail is to come, for it must grow out



of that center line. How must it look when the beast is folded into shape? Well, it must curl, as at C, and so we must lay it off straight at D, and when we have him cut out we can curl that tail by "scraping" it, that is, drawing it over a thumb with the scissors. The head and neck will need to stand up somewhat, for a healthy dog never hangs his head; so, as drawn in dotted line at E, we must allow for their

CAT
DOG
TURKEY
COCK
DUCK
MAN
ELEPHANT
HORSIE
COW
DEER



curve and lay them out as at F. The ears must be thought of as in side view, but laid off in plan in such a way that they will fold up at the right angle and bend over at the tips, to make the face look natural in front view. A new problem lies in wait at every turn. The planning of the flat, as the one well says who first conceived of this breed of animals, "calls for every watt of imagining power one possesses, and the cutting of it calls for the sharpest possible visualizing of every detail of the animal." Use a paper quite stiff, but not too thick. The tails and feathers can all be curled by the scraping process. Inasmuch as no paste is required, this kind of paper cutting is the cleanest and least objectionable from a sanitary point of view. In the views shown, the animals are not cut to scale, but that will only make the problems all the more fascinating, as you will have to use your own judgment as to the relative sizes of, say, a calf and a horse. As to the sizes of the elephant and the hen, there should be no special difficulty. You have here two full pages of the flats from which these animals are folded, and comical enough many of them appear. Both the giraffe and the pug dog, when seen in the white silhouette form, suggest the gentleman dressed in evening clothes, ready for the opera; or at least as some of the clever caricaturists might draw him. Be sure and get that bend of the back into the frog. The kangaroo likewise is a creature that scorns a straight backbone. A study of zoölogy, which is just the life history of animals, will be of great help to you in this work. And when you realize how many animals there are in the great and ancient aristocracy of the jungle and the desert, your power of classification will develop afresh. You will be proud of how many of them you can name the next time you visit the circus or the "zoo." How many of the great cats can you tell at sight — the lion, lioness, tiger, jaguar, leopard, ocelot or cheetah; the "tiger-cats," the cougar, puma, catamount and other panthers, the lynx or the bob-cat? And how about the great pachyderms — the elephant, hippopotamus, rhinoceros, tapir and the wild hogs? Or the numerous antelope family — the eland, koodoo, gnu, chamois or gazelle; or

same royal colors as expressed in the ringed spots of the jaguar! How these colors would contrast with the sober gray of the elephant, or the shiny black of the hippopotamus! A family of dogs would be very instructive; consider the commoner breeds: the great Dane, the St. Bernard, the mastiff, Russian wolf-hound, Scottish deer-hound, the collies, the shepherd dogs, and the Old English sheep-dog; the family of hunters, including the bloodhound, pointer, setter, retriever, foxhound, beagle, basset and greyhound. The spaniels, the bull-

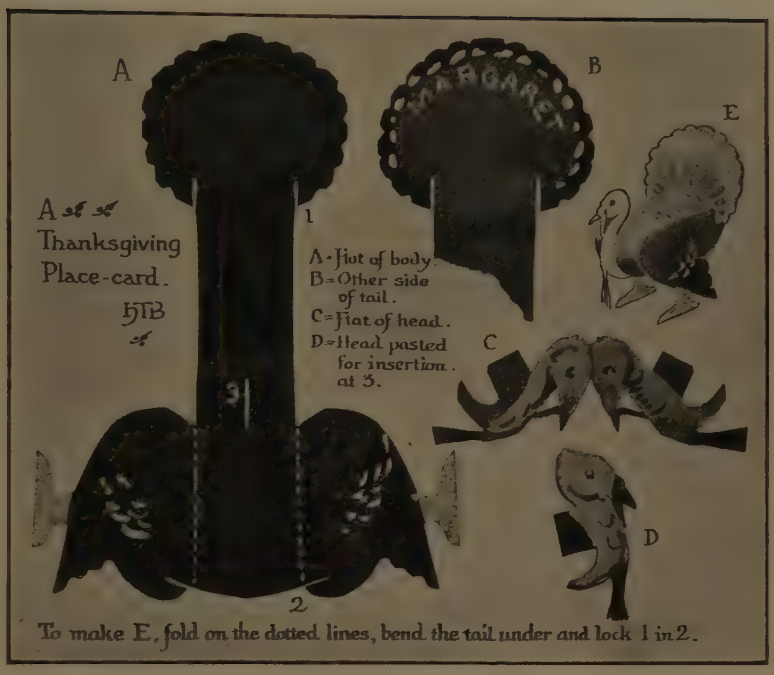
the other ruminants, such as the great moose as distinguished from the so-called elk; the caribou, yak, aurochs and musk-ox? Is the llama a true cousin of the camel and dromedary? And why does his neighbor the alpaca, so like him, belong to the sheep tribe? What a menagerie you can make, once you get started! In what family does the queer and fascinating giraffe belong? And do you know how many near cousins the good horse has, such as the mule, ass, onager, okapi and zebra? Or our friend the dog, who is a relative of the wolf, dingo, jackal and bear? And suppose, in addition to making these paper treasures, you color them! What a chance to study those wondrous bars of sable upon the tiger's cloth-of-gold, or the

dogs, and those faithful and amusing fellows, the numerous terriers, such as the fox-terrier, the Skye or the Lancashire, the Irish terrier, short-haired or long-haired, the larger Airedale, the big and valiant bull-terrier; or the numerous family of poodles — how interesting to snip out their long hair. Each, by reason of difference in either size or shape, distinct enough to be interesting and to offer a new problem in this new animal-cutting game, so deliciously whimsical in its results. How many can you make?

THE BUNNY, which may be yours for the making, is an animal made somewhat like those shown in the preceding pages, but with the art of cutting carried further. This produces a different, and, needless to say, a more interesting animal, for he seems to be really and truly solid. Here we advance a step and try for more exact form, for better modeling, as the term is. Indeed, by continued practice and careful study of animal shapes it is possible to make quite an elaborate form, which will express with considerable fidelity each detail of our four-footed friends. How to make this rabbit is very plain to be seen from the flat here pictured. And it will come out so "cutely," and with so little trouble to you if you follow the lines, as to justify the elation of the designer where he ends with the French word which means "There now!"

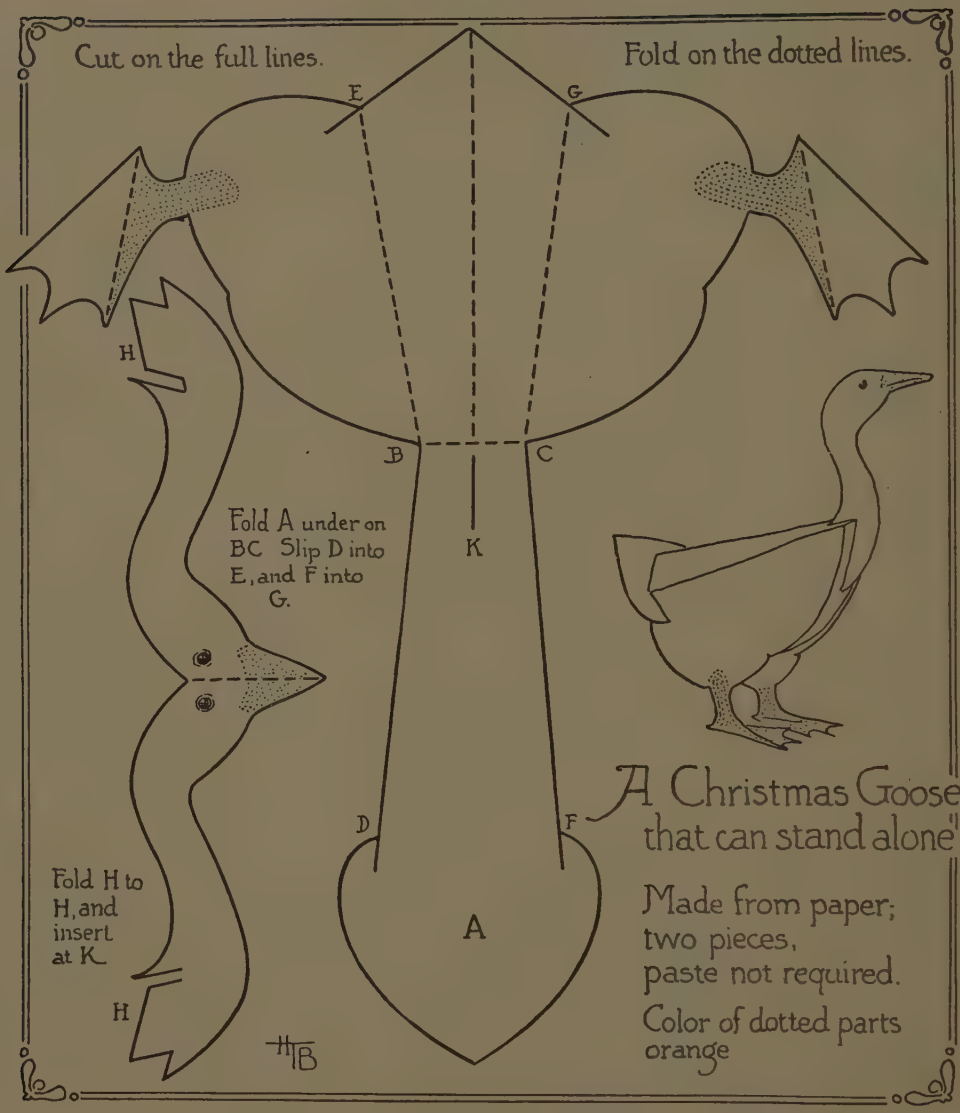
The ears, threaded through their proper slits, likewise the tail, act as keys to hold the back curved in the proper sweep from head to tail.

See if you can design another rabbit, not crouched in this position, but sitting erect on his hind legs as only a rabbit knows how to do. Can you design one that will hop? No directions are given here for such a bunny, but someone had to think out every such idea, and you may prove to be such a person. Good, tough paper can be made to do many things and is elastic and "springy." Remember that there are rabbits of many colors —white, black, brown and gray, spotted in all sorts of combinations. Here your paint box will come in handy. THE LITTLE BUTTERFLY is cut from paper, mounted upon a heart-shaped card as if he had just alighted there, and is painted true to the life on both sides of his wings. The body may either be included in the cut-out form or it may be painted on the card where the wings join, allowing a narrow strip between when cutting out the wings. You will find these wing-forms rather hard to shape, but in the painting of them there will be great reward, for nothing in all animal form offers such gorgeous contrasts and harmonies of color.



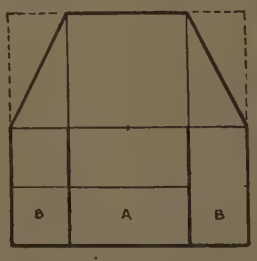
A TURKEY GOBBLER. Another one of those amusing "hollow-solid" creatures made of paper, but how lifelike! Probably the most so of any of the whole group. This may be because it expresses so accurately two features peculiar to the gobbler, namely, the erect and curved tail and the curiously lowered wings. There is only one other North American fowl that assumes anything like this attitude, and that is the partridge. But he cannot boast the size nor the splendid equipment of tail feathers with which Nature has endowed the turkey. Next to the regal peacock in wealth of feathers, there is no fowl approaching him among the domesticated breeds, for the larger roosters must be ruled out for lack of beauty. But whether "spread" or in ordinary form, the turkey gobbler offers lines that are very pleasing to the eye. In quiet, he and his mate are long bodied, sleek and rather graceful. When roused he exhibits in his every line opposition, defiance, contrast. In making this creature, you should pay special attention to his head, for in this he is unlike any of the other barnyard fowl, or for that matter any wild fowl except the vultures, and his "poor-white" cousin, the turkey buzzard. There is little but a queer, wrinkled, ridged skin without feathers upon the entire head and neck. This skin is very red, so if you paint the turkey, as of course you will try to do, have the neck of the right color. It is a medium light tint of red, with an occasional hint of violet in some of the more livid folds. On the lower part of the neck-piece allow extra paper, as shown in the black, chisel-shaped pieces before the two parts are pasted. This will form the "brush," that odd tuft of coarse hair which hangs below the gobbler's neck and looks precisely as if it were a bunch taken from the dust-pan brush. His comb, too, or what answers for a comb in the rooster, is simply a long, pendent affair which seems like all the skin of the head stretched forward and rolled into this curious appendix. It hangs over one side of the bill, and the gobbler resents any attempt to touch or stroke it. In fact, he is seldom a pleasant-tempered animal, possibly because he has a long-standing grudge against mankind in general, and against New England mankind in particular. Perhaps you do not know that some gobblers dislike the color of red. It is even said that they will chase the smaller people who wear it. Perhaps the gobbler has tried in this way to imitate the bull, his big associate of the barnyard.

But our gobbler has a further use than that of merely amusing us or occupying our idle moments. He is a place card. And for what season, to be sure, but Thanksgiving? Nothing could be more appropriate than a flock of these sturdy fowl, greeting the eyes of family and guests as they reach the dining room. Each member of the dinner circle should find his or her name printed upon the spreading fan of the turkey, and you could even tuck inside each bird some little bit of confection or a little folded bit of written sentiment. Of course if you like you can try a hen turkey,



or perhaps a CHRISTMAS GOOSE would appeal to you. The paper flat of this bird must be made accurately if the goose is to be able to stand. If you are not sure of copying the diagram correctly, trace it. Follow the directions given with the diagram.

If the foregoing projects have seemed too difficult, the PLACE CARD, shown as Fig. V, is simple enough. Begin with a square of rather stiff paper and cut it, as shown in the diagram, following the heavy lines. Fold it upon the light lines. B and B tuck in behind A, which in the sketch has "Marie" printed upon it, and thus weight the base enough to make the card stand. Any decoration you desire may be substituted for the turkey.

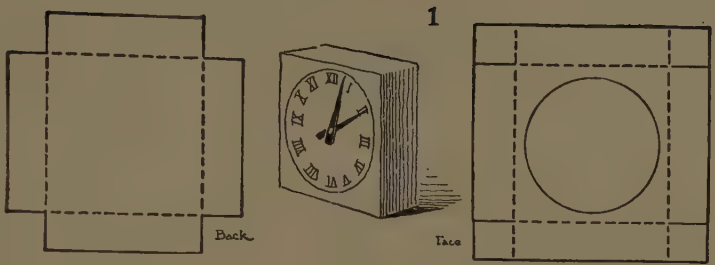


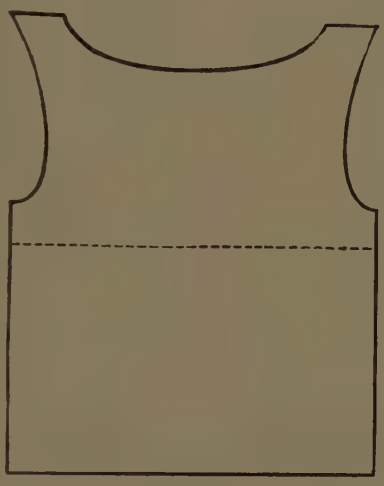
A decorated Place Card that will stand. No pasting required.

Another simple project is the EASEL, Fig. 8. The flat of it is shown above the sketch. The lines of its support may be modified at will. A link of paper, *a*, keeps the support in place. A picture may be mounted this way, or the easel may be used as a place card. Below it several other forms of easel place cards are shown. In these the ornamental device is pierced, and the "inside" of the easel is painted some rich color to shine through the openings. These place cards were made by children of about ten years of age.

Place cards of this kind designed for special occasions, a birthday party, Thanksgiving, Christmas or some other festival, are always a welcome and delightful addition to the table. Comic designs thus made are jolly for a Halloween Party.

Still another easy problem is presented at the top of the page, a TOY CLOCK. Such a device is useful in teaching little boys and girls to tell time, and also for indicating the hours when certain tasks should be done, or when medicine should be taken. A pin thrust through the paper hands into a bit of cork behind will serve to keep the hands in place. If the friction should not be sufficient put a thin slice of cork beneath the pin head. Cardboard is better than paper in this case. If it is too stiff to fold easily, score the lines to be folded *on the outside;* that is, cut the cardboard part way through with the point of a knife. You will need your compasses for drawing the face and its figures. Draw first the circle to define the face. Next a light circle to locate the outside ends of the figures, then another light circle to locate the inner ends. Locate next the position of each hour dot. Then draw the figures, the axis of each group corresponding with a radius of the circle.





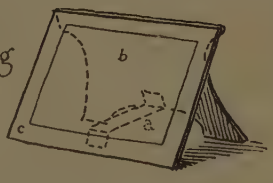
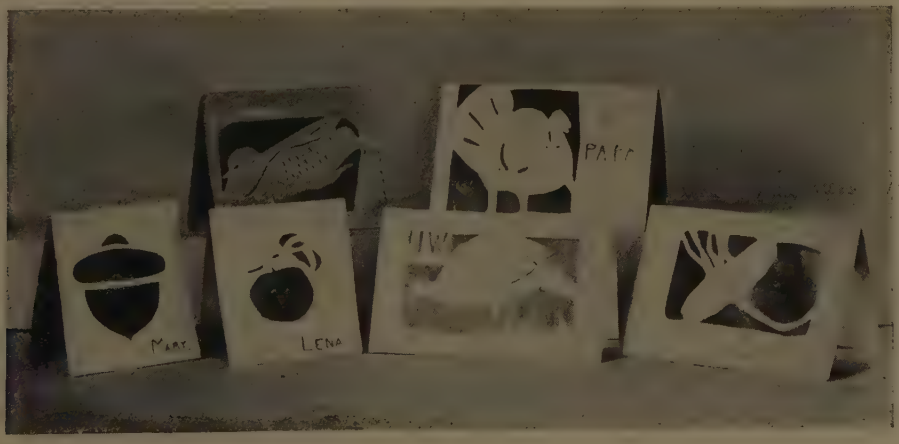
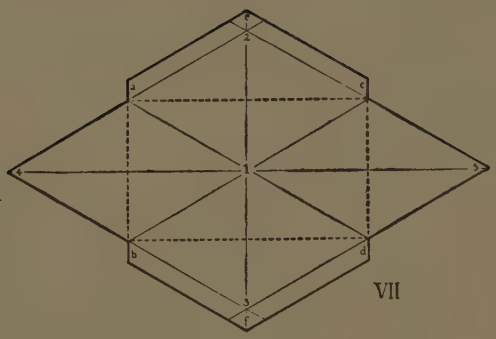


Fig. 8.
A Standing Card.
6"x3¾"

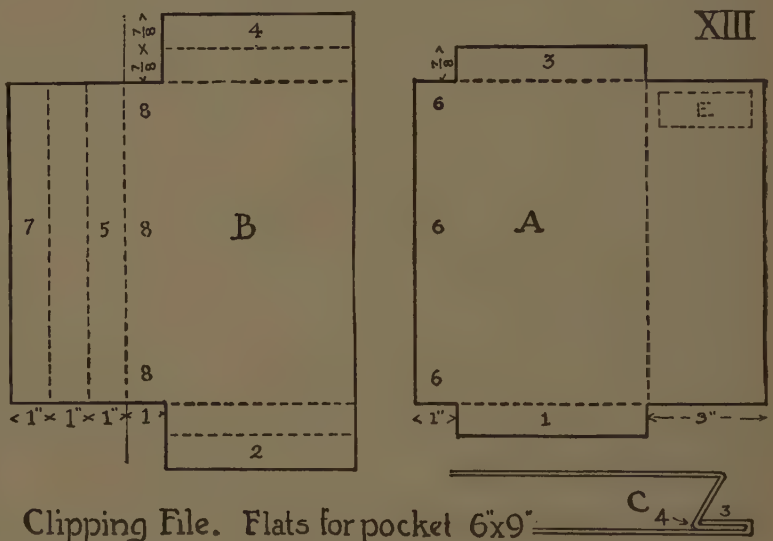




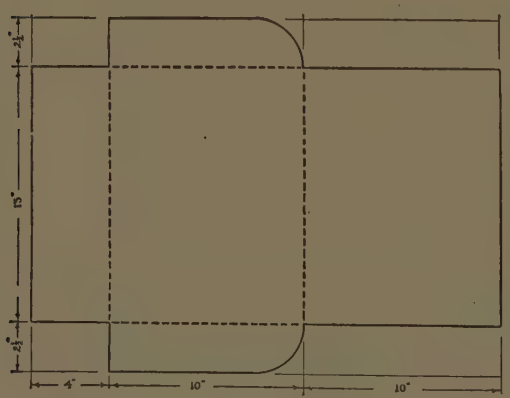
VII

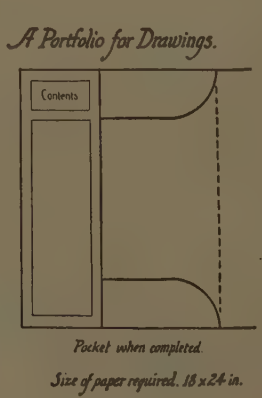
To make an ENVELOPE to fit any card: Place the card in the middle of a sheet of paper at least four times its area. Draw an oblong around the card, one-eighth inch larger on every side. See dotted oblong, Fig. VII. Draw the diagonals of this oblong. Draw its diameters and extend them to the edges of the paper. Set off on each extended diameter a distance equal to that from the end of the diameter to the center of the oblong 1. Connect the points 2, 4, 3, and 5. Extend the short ends of the oblong a half inch as at *a*, *c*, *b*, and *d*. Place points a half inch beyond 2 and 3. Connect *ea*, *ec*, *fb*, and *fd* with lines parallel to the diagonals. Cut out the flat on the heavy lines, fold on the dotted lines. Paste like any envelope.

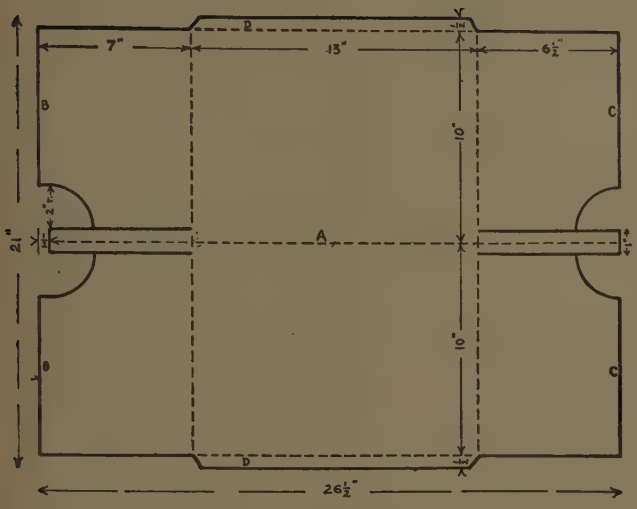
This FILE is composed of envelope-like pockets, large enough to hold penny prints and common clippings. Each pocket is made of two pieces of paper, cut and joined as at XIII. Covers, prettily decorated, are desirable though not necessary. Make flat A and B as shown. Fold the ends as shown at C, paste 3 down on 4, and 1 down on 2. Paste the under edge of 5 to the under edge of A at 6–6–6. (Turn the pocket over to do this.) Paste 7 to the next pocket on the edge corresponding to 8–8–8 of B. On the outside of the flap of each pocket, at E, draw a little label, where you should state concisely the contents of the pocket. If covers are used, allow an extra inch in the width of the front cover, to fold under and fasten to the first pocket at 6–6–6. Draw design on the front cover, suitable to the contents, lettering the title with great care. For the PORTFOLIO FOR DRAWINGS, the flat is self-explaining. The use of a few simply made portfolios like this one will help in the formation of orderly habits.



Clipping File. Flats for pocket 6"x9"

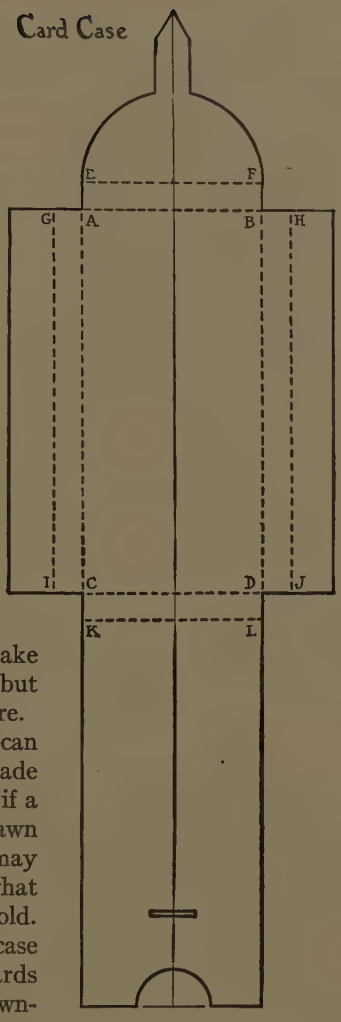






This ENVELOPE to hold choice papers or drawings is of heavy manila paper. A good size is 26½ × 21 inches to start with. Lay this down with the 26½ inch side running from left to right. Fold it over, from you, so as to crease it into halves. Make the crease plain by rubbing with a ruler. Measure on the inside one-half inch on each side of the crease and draw lines parallel to the crease (see diagram) to form the strips to reënforce the back. Follow the dimensions shown. Paste the narrow strips down upon A. Paste B and C together, and close the edges by folding over and pasting D. The result is a double envelope, opening like a book, with a pocket in each cover.

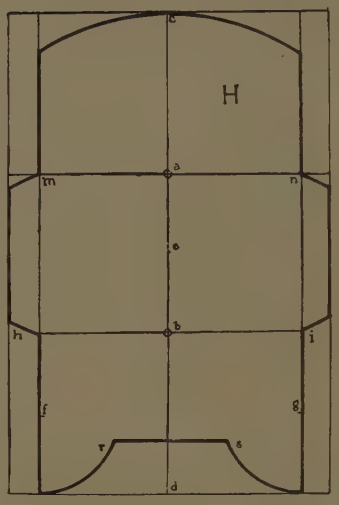
A CARD CASE for cards of any sort may be made of heavy paper or light cardboard, by drawing an oblong, ABCD, one-eighth inch larger all around than the card size. Extend the sides and ends indefinitely by means of light lines. From each corner of the oblong set off on these extended lines a distance equal to the thickness of the pack of cards, and two cards more, locating the points E, F, G, H, I, J, K, and L. Connect these points with dotted lines, as shown in the diagram. On EF, draw a semicircle and add the tongue. On GI and HJ add the laps one-half inch wide. On KL add the oblong equal to the first one, ABCD. Draw the semicircle and the slit each in its proper place. Cut out on the heavy lines, fold on the dotted lines. Slide the pack of cards within, and paste down the side laps. Small laps left at K and L will make tighter corners, but are not shown here.

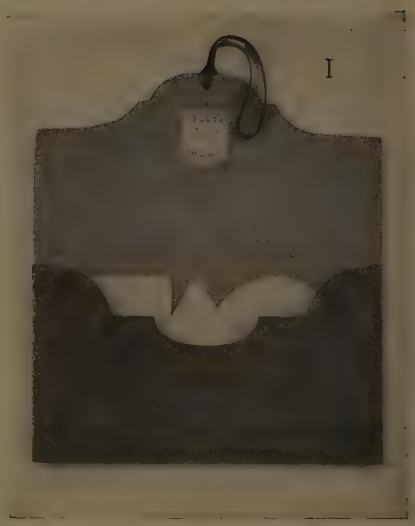


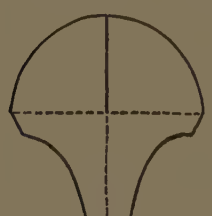
The ENVELOPE can of course be made more attractive if a good design be drawn upon it. This may be suggestive of what it is meant to hold. For example, a case for visiting cards might have the owner's monogram.

The CARD CASE may be utilized for holding place cards, for Thanksgiving or other holiday use. The cards should be of a design related to that of the case. The time of year should be considered: a floral design with the bud, blossom, fruit, or leaves, being used according as the time is June, August or October. Game cards may be kept in it, and the idea of the game be suggested by the design on the case. You will enjoy making any such object much more if you try and elaborate it according to your own ideas, using this form as a basis. If you are very ambitious, buy some sheet celluloid and make the case of that. The result will please you.

A POCKET CASE, shown at H, is just what we like to receive at Christmas time from some friend who makes things that are beautiful; it may be made of leather, leatherette, buckram, linen from the bookbinder, or even from good oak tag paper. H shows how it is made. It is useful for carrying car tickets, admission cards, or even your visiting cards. To make it, take a sheet of the material 6 × 9 inches, draw its long axis and trisect it, locating the points *a* and *b*. Draw lines through these points parallel to the short sides of the sheet; draw a line parallel to each long side and one-half inch from it. Find the center of the sheet, *e*. Locate the points *f* and *g*, one and one-half inches from the short side. With center at *e*, and radius *ec*, draw the curve of the flap. With center at *d*, and radius *dm*, draw the arcs *m* and *n*. With same radius, and center at *c*, draw arcs *h* and *i*. With centers at *f* and *g*, draw arcs *r* and *s*. The horizontal line *rs* is one inch from the edge. Cut out on the dark lines and fold to make the cardcase. The laps, *mh* and *ni*, may be folded over first and glued on the outside, so that in the finished work they will come inside, and not show, provided the glue is strong; but if it is weak, the part *fg* would better be folded up first, the laps glued on the inside, and folded over upon it. This case could also be made with a tongue to tuck through a loop, like a pocketbook of the older styles. The tongue or strap would be made by cutting away on each side of the upper division of the sheet, and the loop through which it would pass could be made by cutting two parallel slits, horizontally, above *rs;* or, if the material used were leather, this loop could be glued on at its ends, and thus be slightly raised in the middle for the tongue to pass under more easily. But by cutting the two slits to form the loop, a few insertions of the tongue would slightly stretch the loop, and so make it easy to use. It would be well in making the tongue to stiffen it by an under-piece, as long as the tongue itself. At I is shown such a pocket case, with more elaborate modifications. Its edges are cut into a more studied design, and a loop of rubber band has been attached to the flap, to be snapped around the case and hold it together. In the case thus shown, the maker has added a little ornamental label, which might be made for the owner's name, with address, or used merely as an ornamental accent. Further decoration might be done in the form of a line tooled or drawn parallel to the edges so as to show upon the outside when the case is closed.

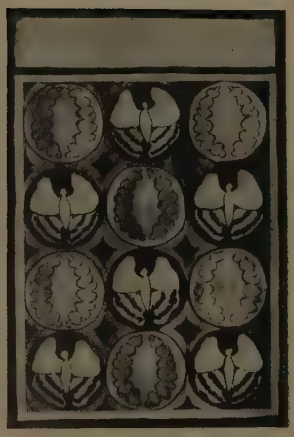






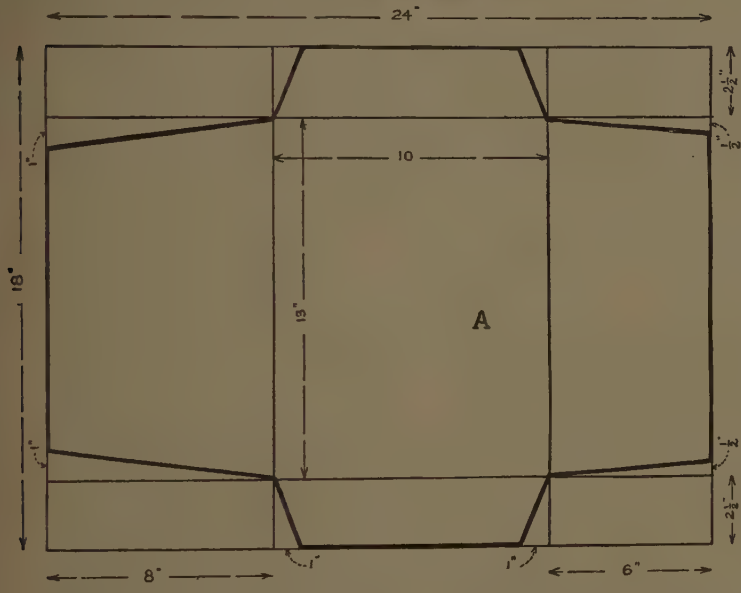
What is more beautifully useful than a bracket? This CORNER BRACKET shows a simple scheme of curves, which may of course be varied, and its top and braces are cut from one piece. Any bracket should be designed for a specific purpose and for a particular place. This graceful bracket is meant to hold a vase in a corner. It is made from tough cardboard, and is to be cut on the dark lines, folding on the dotted lines. This makes the top double and strong. A case like this could be covered with an enameled or glossy paper of any color not too bright, pasted smoothly on to the cardboard. The effect would suggest somewhat a leather case. An ornament cut from paper of a complementary hue would add to the effect.

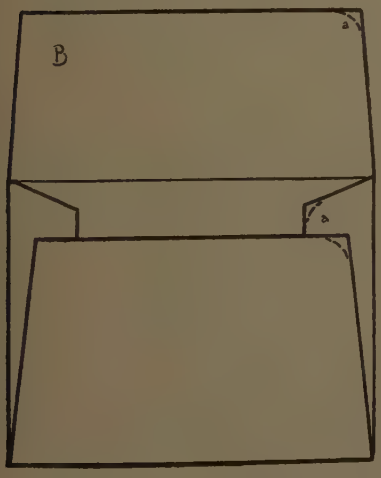
This MAGAZINE COVER needs no directions as to laying out and making. It is meant to fold around and protect a magazine from wear. This cover is decorated with a design composed of conventional units, within a plain border. These may be drawn, tracing all from your first one, or by the fascinating way of cutting the unit on the end of a block of wood and stamping the pattern. A set of these covers



may be made, one for each magazine you are so fortunate as to have.

AN ENVELOPE FOR SCHOOL WORK. This is a simple problem in drawing, folding and cutting, but, like most simple things, if not done very well, its defects will stare at you. A sheet of tinted cover paper, light weight, is a good material, the size to be 18″ × 24″. Mark off the parts to be folded over of the dimensions given, which provide for a finished envelope 10″ × 13″. Cut out on the heavy lines. Score and crease the light lines, and fold them up against the edge of the ruler, to insure even work. Paste the 8″ lap on the two narrower ones folded in. The corners of the 6″ lap should touch the edges of the wider lap B when folded over. You may vary the corners and edges of the laps as B. See suggestion at *a*. At C is one layout for the decoration. The name of the owner and his address might go in the two long spaces near the top. In the center, *b*, a design may be drawn and tinted, or cut out in stencil and colored paper pasted under to bring it out.





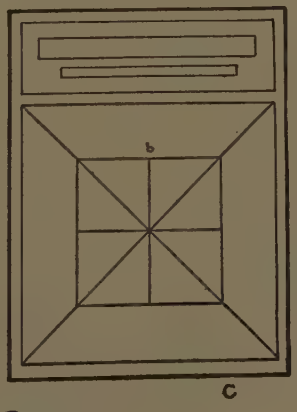
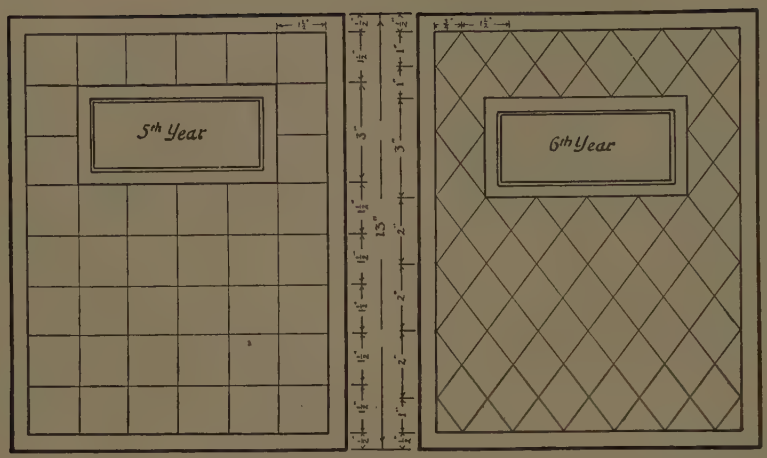
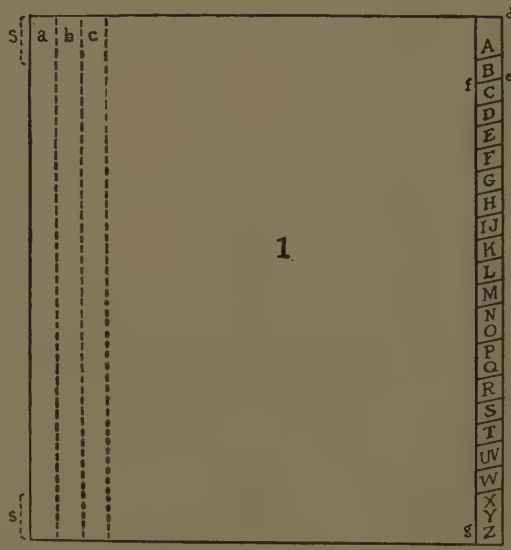


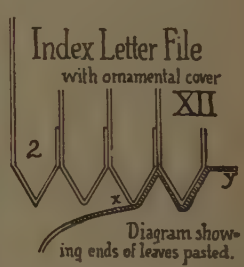
Plate 1.

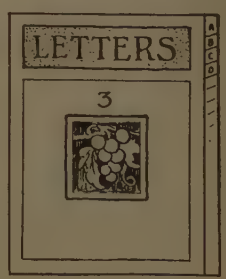


A PORTFOLIO COVER, DECORATED. The portfolio is made on the general plan of the Envelope for School Work. The plan for decoration applies to any similar surface. Lay out the face, following dimensions. Think out the plan, squares or lozenges. Design a unit to fit the plan. A lilac blossom is adapted to the square; other shaped blooms will fit other plans. Repeat your unit in each space to make the pattern. Color with a group of hues much dulled, to give little contrast. The finished design should strike the eye as a whole, and not the separate units or spaces. Whatever lettering is done in the title-square should be bold and simple.

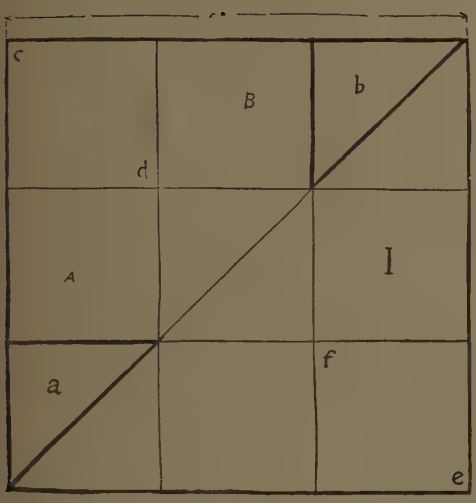
A LETTER FILE WITH INDEX AND ORNAMENTAL COVER. Material: 21 sheets manila paper 9″ × 10″; two sheets heavy colored paper for covers, 8″ × 10″; two strips of thin, tough paper, 1″ × 20″. Make first a key sheet, as indicated in diagram 1, full bigness of the whole diagram. Make the twenty sheets to form the file, each with its proper tab, to correspond with this key sheet. Make the first sheet without a tab. The second with tab A, the third with tab B, following down from *d* to *e* to *f*, and then straight down to *g*. Thus you cut off from each sheet the strip below the tab. From each sheet downward you cut off less. Now fold the sheets on the dotted lines, and paste them together as shown in 2. The file is now constructed in the main, but if it is to receive considerable usage it is well to strengthen it at the back or binding. This can be done by means of narrow strips of thin, tough paper, added where indicated at *s s* in Fig. 1, and shown in section at *xy* in 2. These strips should extend from the first leaf without a break to the last, to insure the strength necessary for endurance; for a file, if it is made for use, is constantly handled.

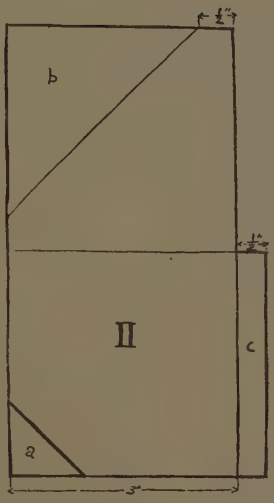




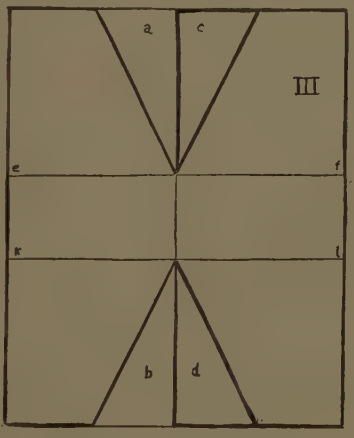


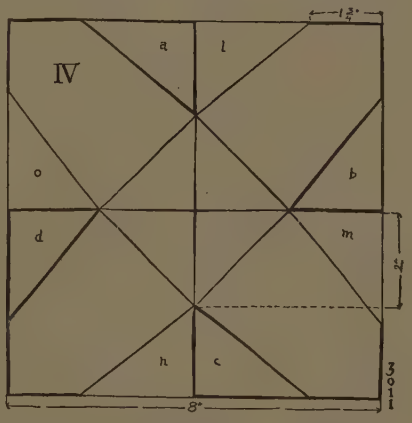
Make the front cover enough narrower than the back cover to show the letters of the index, for therein lies the whole value of a file, to be able to refer at once to the needed letter. A good design should ornament its front cover, which must include the lettering which announces its purpose. The motive for any ornament might well be taken from the fall nature-drawings of a school class, as the contents are a harvest. The grape motif shown above suggests many others.





MAY BASKET time brings a return of the joy and excitement we felt at twilight, when, laden with the product of our own hands, we took the trail with stealth for the house we had picked out for attack. For little children the basket here suggested at Diagram I is easy to make. Lay out the basket on a square of paper, any size. Fold it on the diagonal. Cut out triangles *a* and *b*, and use the other triangles to fasten inside as laps under squares A and B. Fold *c* outward to *d* and *e* to *f*. Make the handle half an inch wide by folding an inch strip and cutting it through the middle. Fasten down the laps with gilt stars or other ornaments.



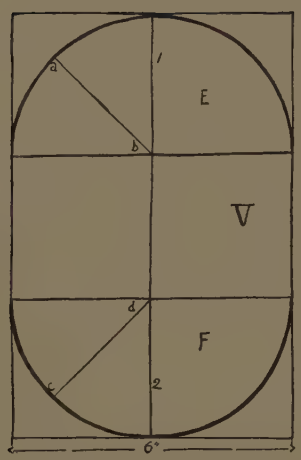


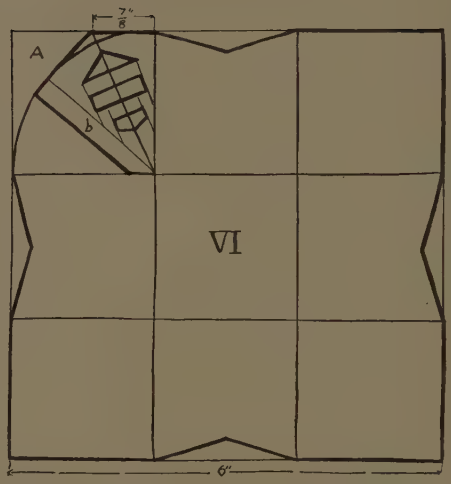
For Basket II, fold on the light lines. Use *c* as lap. Cut off triangle *a* and fold back *b*. Add "streamers" to the lowest and two side points by crimping up with scissors narrow strips of tissue paper. This is done by taking two strips between thumb and finger of left hand, and with scissors or knife laying it in little pleats, holding it firmly.

To make Basket III, cut out triangles *c* and *d*, use *a* and *b* as laps, and fold on the light lines. Add seals, stars, bowknots or other decorations to simulate fastenings.

In Basket IV, we arrive at something more ambitious. To make it, cut out triangles *a*, *b*, *c*, and *d*, and use the others as laps. Cut out ornamental figures from drawing paper, trace their forms upon the sides of the May basket by drawing around them and, when done, tint these decorations in water color. It will add much to the effect of such a May basket if you tint the inside with a single color.

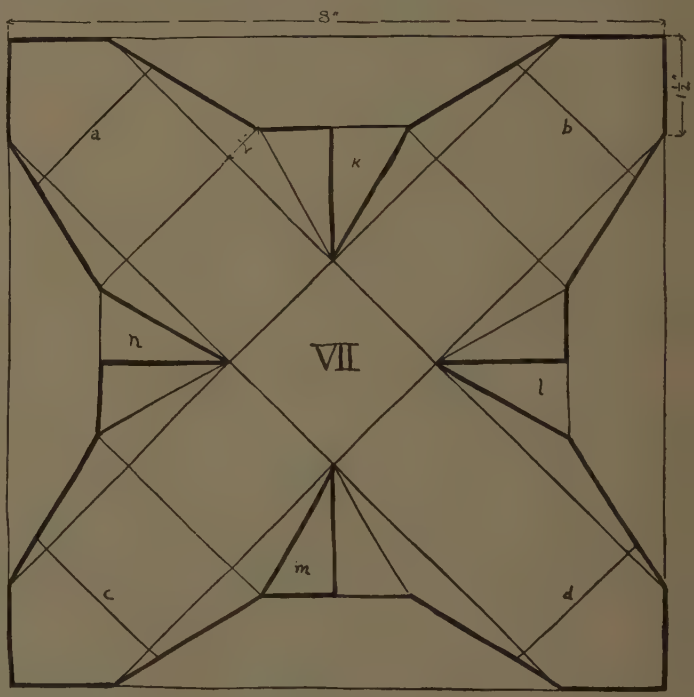
You will soon begin to vary these simple forms and methods, and will change the size and alter the decorations. In fact, in a set of baskets made upon this one or any other model, each might be colored differently. If the inside is to be tinted, it is well to lay on the tint before drawing the pattern on the other side. May means so much to the world that May baskets, the making and giving of which is a very old custom (Shakespeare and Chaucer both mention them), are especially interesting to one who cares for the things that survive. Most of the older countries celebrate the season with festivals of some sort. The Pilgrims once forbade a Maypole festival in the Old Colony, but their act was a most worthy one, as the occasion was disorderly.





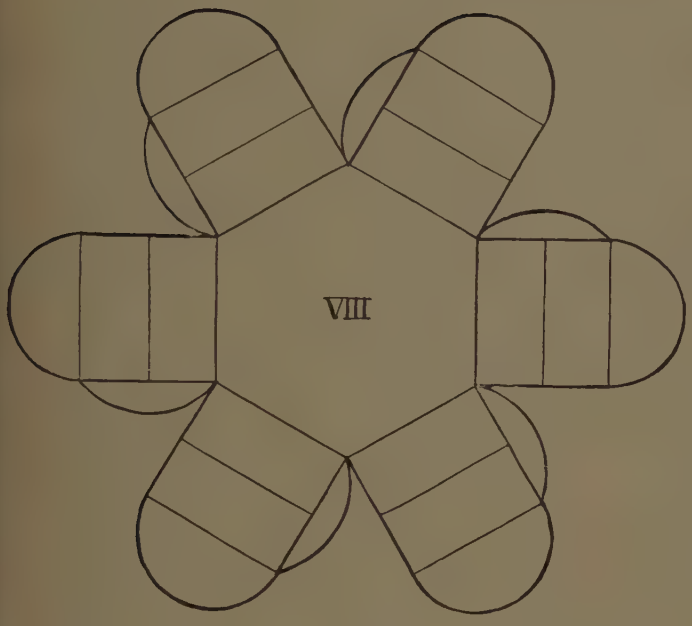
drawing the corner design use the compasses. Any design that suggests the effect of basketry is best. Line the basket with a contrasting color to that of the paper, or that tint which you have painted on it. Paste two handles, crossing over each other, on opposite sides, where the shallow angles come. Tint the inside of handles same as inside of basket. Pink and white or yellow and white are effective.

The basket shown in Fig. VII is a little more ambitious as to its make-up. Measure from the angles one and one-half inches, and run the lines across the square. Cut out the triangles *k*, *l*, *m*, *n*, using the others for laps. Fold back on lines *a*, *b*, *c*, *d*. Add a handle of a single strip. The matter of good color ought to be kept in view. Whether selected in the paper or cardboard, or painted on, the colors should harmonize. This may be by means of different shades of one color, or by contrasting colors.



May baskets like those shown in Figures V and VI carry on the idea of paper cutting and folding to a more interesting point, while Fig. VII is well advanced in this respect. Fig. V makes a May basket quite different in form from any of the others, in that it employs curved lines. It is a strange fact that it is very much in shape like some of the great scoops that are a part of the steam shovels used in making railroads. The same form answers for both. One holds many tons of earth, the other a handful of candy. Both must be strong enough for their purpose. This May basket is made by folding on all the light lines, cutting on the curved lines, marked heavier than the others, and on lines 1 and 2. Design an ornament, cut it from paper, and lay it on *ab* as a center line and trace around it. Fold on this line and cut out the design. Now tint E and fold under the cut-out design to show the color through. The other side of the basket may be treated the same way or left plain.

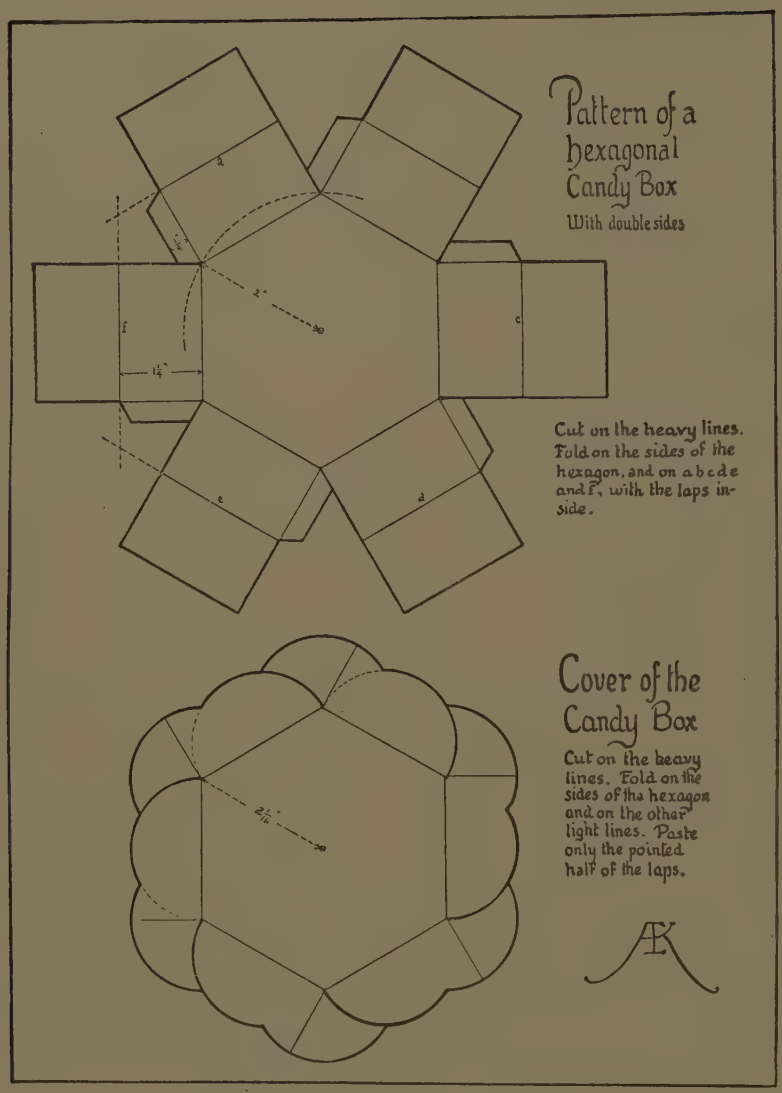
Fig. VI produces a May basket with corners filigree in effect. The handles, two in number, cross above and offer another quite different basket. It may be made by the simple squaring out on any size paper, as shown in the diagram, and cutting on the heavy lines. Use *b* as a lap. Cut all the corners like A. In



The May basket to be made from the diagram numbered VIII folds up into a very pretty form, suggestive of one of the vegetables of the tomato shape. In fact, in every beautiful form it is impossible to get away from some pattern set us by old Dame Nature. This basket is based upon the hexagon, which, as everyone knows, is one of the shapes known to artists and craftsmen as polygons. Remember this in forming or designing anything, and never be ashamed because you cannot design some new form for a basis. There is no room to be ashamed, because, on the contrary, to imitate nature well is in itself a great achievement. It may be well to name the common polygons, in closing this series of May-basket forms. They are: the triangle, square, pentagon, hexagon and octagon. Most drawing pencils are hexagon-shaped, or "hexagonal." All the polygons may readily be drawn by remembering that a circle will contain them.

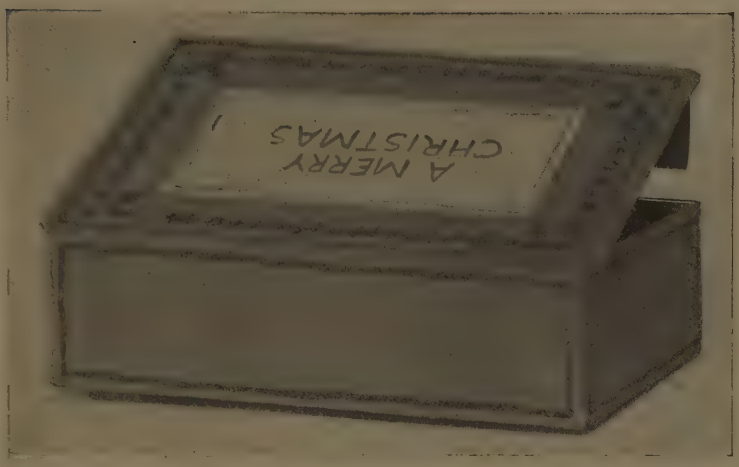
To draw the hexagon, therefore, first describe with your compasses the circle of the size you wish the basket to be on its base, draw its vertical and horizontal diameters, using the T-square and triangle, and with either end of the horizontal diameter as a center, and radius to center of circle, describe an arc to cross the circle above and below the center. Repeat from the other end of the diameter, and you will have six points on the circumference of the circle which must be connected by straight lines. Your hexagon is now drawn. (There are several other ways of making the hexagon.) With your ruler and compasses, the rest of this basket is easily drawn. To get the six sides, rule across the hexagon and extend the lines indefinitely. Of course the sides may be made as high as you wish, but the proportions shown here are good. Catch the sides together at the top with thread. Upon each side is shown a flap with a curved edge, for pasting the sides together if you wish to make them vertical. But the melon or tomato shape is more interesting. The ends of the handle may be fastened as usual by pasting, and in addition a cross strip may be added near the pasted end, to give additional strength.

Before leaving the subject of the hexagon it may be well to recall one or two other facts concerning it. If you were to take a lot of the pasteboard mailing tubes with which we are familiar, and by exerting equal pressure from all sides at once, crush them together, the result would be that each one would assume the form of a hexagon. This seems to be the form the compressed circle best likes to take. Can you think of a very common instance of this in nature? It is the form assumed by the circle under the manipulation of honey bees. Tear apart any old nest of one of the numerous wasp families and you will find the interior cells of this shape. The comb of the wild bee is also hexagonal in its cells. The hexagon is next neighbor to another polygon, the pentagon, which is not so easy to make as the hexagon or octagon. In fact, the known ways of constructing it are decidedly intricate. Nature often employs the pentagon in the growth of leaves around a stem, or the placing of petals on a blossom. Someone has discovered that a pentagon can be made by the simple tying of a strip of paper in a knot. The strip must be of even width. See page 75.

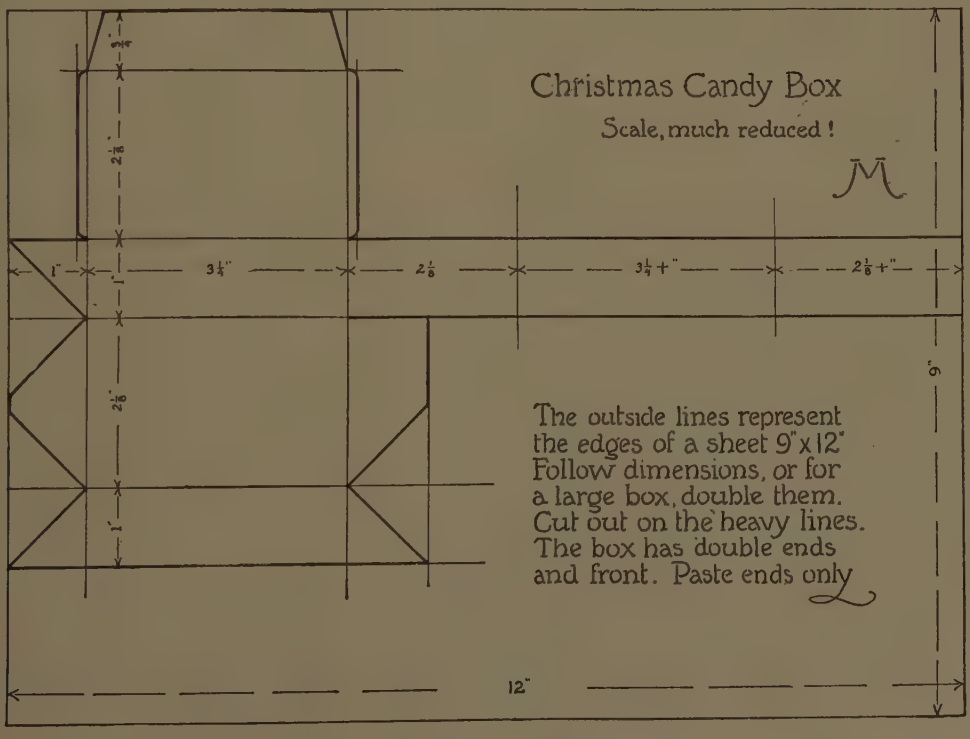

Pattern of a Hexagonal Candy Box
With double sides
Cut on the heavy lines. Fold on the sides of the hexagon, and on a b c d e and f, with the laps inside.
Cover of the Candy Box
Cut on the heavy lines. Fold on the sides of the hexagon and on the other light lines. Paste only the pointed half of the laps.

This CANDY BOX may be made of common school drawing paper, or cut from the nicest colored papers, while, if cut from such material as tinted celluloid stock, a very beautiful gift may be the result. But let us be cautious, and try it from a good, stiff paper, or thin Bristol board. You will see that its bottom is a hexagon, which you are told how to make in describing May basket VIII.

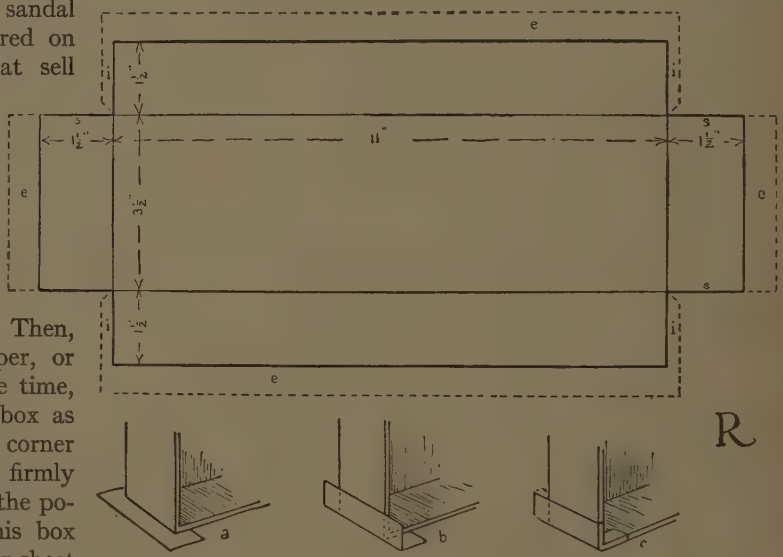
After finishing the hexagon and ruling across the six points for the six sides, determine how high your finished box shall be, though the proportion given here is good. You can locate the folding lines, as *a*, by describing an outer circle from the center of your hexagon circle, with such a radius as that from this center to either end of line *a*. Each of the sides of the box is meant to be strengthened by folding once, — doubled. When you have the box completed in drawing, cut as directed in the diagram, and fold on the light lines of the hexagon, bringing the sides vertical. Connect them by pasting the laps, and paste and fold down the top halves of the sides. The bottom may be doubled by pasting in a slightly smaller hexagon. The cover for this box should be made one-sixteenth of an inch larger than the box itself. The compasses are to be used twice on each side. Draw the arcs, or parts of circles, first, which are centered on the points of the hexagon. Where these touch the sides of the hexagon will be the centers for the others, — six of each. When you have cut, folded and pasted these semicircular laps as directed in the margin, the cover will slide over the top of the box smoothly. But a box of just plain cardboard is not as attractive as it can be made. Try to make a design for the top; lay out a smaller hexagon, and elaborate this with scallops, either as shown in the diagram (without cutting, of course) or with one semicircle to each side of the hexagon. Decorate this with a design and paste on top of the box. As the hexagon, like all other polygons, is based on the circle, a circle will lend itself in good harmony for decoration. Can you make a decorative unit for this box cover composed of a double tre-foil?



Here is shown a CHRISTMAS CANDY BOX that can be easily made of oak tag stock, decorated in water-color tints, and finished with an appropriate salutation in plain Roman letters. To make the box, follow the directions lettered upon the diagram, which allow for doubling the size if you wish. Be sure and include the little laps shown on the right and left edges of the cover (upper left hand), as these are to be folded down, and are meant to keep the cover from being pressed down into the box at the short sides. The cover is made with a wide tongue to turn down and tuck into the front side of the box, thus making the contents of the box secure. Be sure and not paste the back of the front side to the front, or you cannot insert the tongue of the cover. But on the ends do exactly the opposite — paste them, as this is meant to give strength to the ends. Of course the decoration of the box is what adds the crowning touch. One way to make the box unusually pretty is to cover it with thin white paper, decorated, let us say, with a simple border line in red, and a corner unit of two green holly leaves and red berries. Remember that green is the contrasting color of red — its complementary. Let the green area be much less than the red, or much greater. The two colors should not vie with one another.



This GLOVE BOX may be made up into as beautiful an article as any offered for sale in the department stores at Christmas time. It may be substantially made of wood, but for the beginner a rather stiff and tough cardboard is better. If made of wood, however, it may well rank with the boxes of sandal wood and olive wood offered on the counters of stores that sell Oriental goods. It would be a good test of your skill with bench tools. For a cardboard box lay out the drawing for the flat shown at R. Score each line (that is, cut it less than half through) and cut out the flat on the heavy lines. Then, with slips of gummed paper, or slips glued or pasted at the time, fasten each corner of the box as shown at *a*, *b*, *c*, keeping the corner you are working on down firmly upon the desk or table in the position indicated. When this box is dry, place it upon another sheet of cardboard and mark around its base to make another oblong, corresponding to the largest oblong in R, but larger by one-sixteenth of an inch all around. You are now planning for the cover of the box. Make this oblong the basis for a new flat, having sides one and one-half inches wide, as before. Score this as you did the lines for the box proper. Next cut it out. Now, placing it upon a sheet of colored paper, make a third flat from the colored paper, but with the additions shown in dotted lines on the diagram R. Laying this flat of colored paper one side for a while, fold up the second cardboard flat, and fasten it at the corners as you did those of the box. Your cover is now constructed, and it will be found to fit loosely over the box as it should. The finishing stage of this pretty box is next in hand. Cover with the colored paper flat the cover you have made, using the paste only on the edges which turn over inside the cover (*e*, *e*, *e*, *e*), on the laps (*i*, *i*, *i*, *i*), and on the ends (*s*, *s*, *s*, *s*). Now cut out for the final base of the box a piece of heavier cardboard, in size $3\frac{7}{8}'' \times 11\frac{3}{8}''$, and cover it with colored paper on one side only, allowing about three-quarters of an inch for turning over the edges and pasting. Now paste this base under the bottom of the box, so that no pasted edges will show. By means of an awl, bodkin or coarse needle, punch a row of small holes one-quarter of an inch apart, and one-eighth of an inch from the inside edge of the bottom, through the bottom and this base, and sew the two together with the cobbler's stitch. Use coarse, strong thread, and do not hesitate to pull the stitches tight. This will enable you to put on and take off the cover without fear of wrenching the box. If you wish to make the work still more finished in appearance, a cover of plain paper may be pasted over the base, to hide the stitches, though this will be found harder to make adhere smoothly, unless the stitches have been pulled well into the grain of the pasteboard.



R

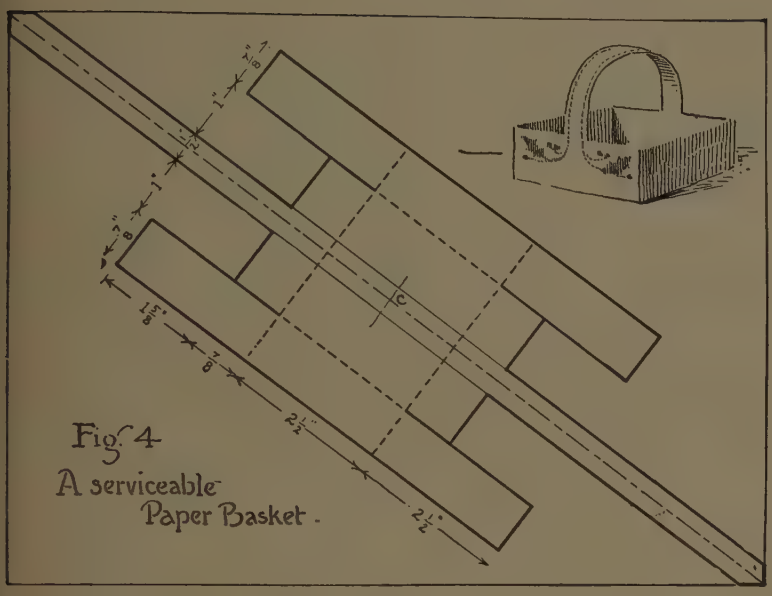
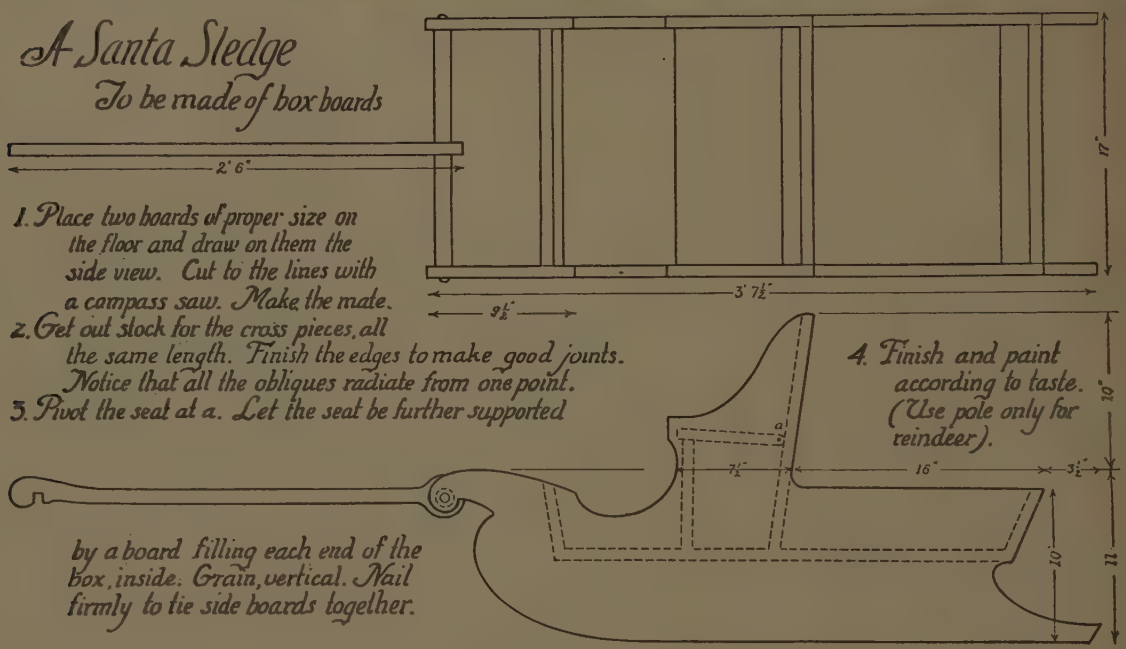


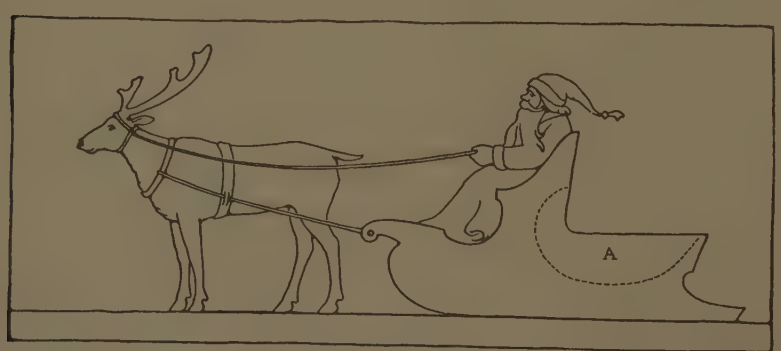
Fig. 4
A serviceable Paper Basket.

This GIFT BASKET is especially suited for a Christmas token, and may be made of any size desired. It should, however, be kept in the class of dainty things. If one is used to working in the metals, there are some good suggestions in this shape and form for that material. The laying out of the flat for this basket is a good problem for the student who is getting on in simple mechanical drawing. It is a nice example of division and sub-division from a center and on each side of a central line. For this will be required a pair of dividers that will do accurate work. A good stout basket may be made of drawing paper, or heavier stock may be used. Lay out the flat as follows: on a sheet of paper or cardboard 9″ × 12″, draw one diagonal, as shown at Fig. 4. Next find the center of this diagonal. The center is shown at *c*, and by extending the short dotted line shown there, indefinitely, you will have a cross line on which to mark off the widths of the sides of the basket, on both sides of the center line, which is the diagonal of the paper.

This will require, including the lines of the handle, three lines on each side of the center line, and parallel to it. If you know how to use two triangles for drawing parallel lines, they will come in handy now. If not, the slower process of measurement will suffice. From the same center, measuring lengthwise on the diagonal, three other lines will be needed on each side of the center. It will be necessary to draw the dotted lines accurately, as the basket is so simple that it must fold with absolute precision. Cut on the heavy lines, and fold on the dotted lines, paste the entire double handle and the two opposite double sides firmly together. Design a Christmas decoration, using holly, mistletoe, an evergreen, or some other symbol well adapted to the surface of the basket. Draw the decoration on the basket, using brilliant colors. In placing decoration upon an object of this sort, it should follow and reënforce the constructive lines of the object itself. Notice that the stems of the holly in the illustration of the finished basket follow the lines of the handle and that the berries and leaves spread out upon the side of the basket, and thus strengthen the impression that the handle is securely fastened to the body of the basket. The ornamental material might be added in the form of decorative borders repeating the vertical and horizontal lines of the body of the basket. The colors appropriate to Christmas are red, the symbol of love, and green, the symbol of enduring vitality and fruitfulness. Taken together, they symbolize the gifts appropriate to the season. The decoration of a Christmas gift calls into the train of thought a most astonishing wealth of material for units, despite the fact that winter is the month when most vegetation lies asleep. For besides the holly there are the American evergreens, which in a sense never lose their leafage, and which number several distinct shapes and masses. A pine or spruce tree repeats well. Do you know its cousins; the spruce, the camper's best friend, with its springy boughs for a bed; or a hemlock with its flat fronds; or the sweet balsam? A green wreath in its many forms is also charming as a unit when bound with the red ribbon.

While the SANTA SLEDGE is self-explanatory, a few words about making the reindeer will be helpful. The pattern given in the lower picture may be taken as a unit, and enlarged by squaring up to the size needed to suit the sledge. This sledge, although given with a dimension for a length of about three feet, may of course be made of any size, and of cigar-box

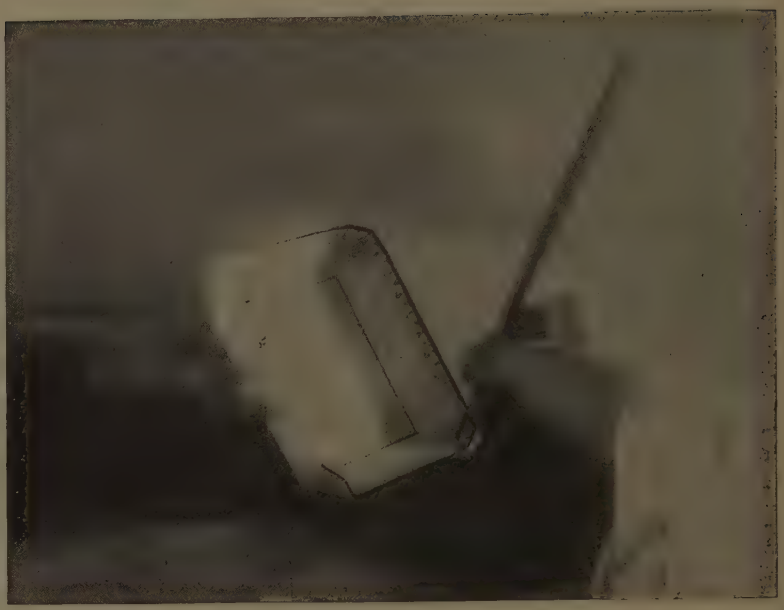

A Santa Sledge
To be made of box boards
2' 6"
17"
3' 7½"
9½"
1. Place two boards of proper size on the floor and draw on them the side view. Cut to the lines with a compass saw. Make the mate.
2. Get out stock for the cross pieces, all the same length. Finish the edges to make good joints. Notice that all the obliques radiate from one point.
3. Pivot the seat at a. Let the seat be further supported
4. Finish and paint according to taste. (Use pole only for reindeer).
10"
7½"
16"
3½"
10"
11"
by a board filling each end of the box, inside. Grain, vertical. Nail firmly to tie side boards together.



cedar or even thick cardboard. A very little one could be made of thick paper. One of cardboard might be utilized as a Christmas candy box. In the case of a large sledge, the deer, after being carefully squared up, could be sawed out the long way of the grain, the horns separately.

A CALENDAR, most useful of all reminders. A calendar pad, of any size required, can be bought for a few cents, in fact, from one cent up. It should be mounted on some sort of substantial stock, preferably darker than the pad, which is commonly printed on white. A plain gray, or one of those neutralized orange or yellow shades that we call browns, tans, or ivories, would be good. Whatever ornament is added should be appropriate to any and all months, unless the calendar is for one month only. The whole should hold together as a unit. A pad and a picture, or a pad and an abstract spot, is not necessarily a good design. The calendar must hold first place without a struggle. The shape of the mount is an essential part of the design, but the shape of the calendar pad will in most cases influence the decision regarding this. The order of steps is as follows: 1. The calendar pad, with the size and shape of the mount sketched around it upon manila paper. 2. Study of the outline for modifications for crown and base of mount. 3. Ornament, equally appropriate for all months. 4. The making of the mount from stiff cardboard of appropriate color. 5. The designing and making of the support at the back.

A gift of kindred holiday thought is a TRIPTYCH, for it comes from a form associated with the church of Christ, whose birthday is Christmas, and the Trinity is suggested by its form. Triptychs have been made for many hundreds of years. Some are famous as works of art. The frames may be simple or ornate. They offer opportunities for the use of the coping saw, the wood-carving tool, color, pictorial art, pen-craft, — in fact a triptych is the open door to all the crafts. It should be made of quarter-inch stock, and the doors or wings hung with little metal hinges. But that shown here is made of cardboard. The fine point in the design is to achieve something that will be as beautiful when open as when closed. Usually three pictures occupy the three rectangular spaces, but a poem or other quotation may occupy the wings.



A PIN TRAY is always useful, and very acceptable to Sister when she begins to do up her hair. This one may be made out of oak tag paper, ornamented with a painted design. The flat for it is a square, 5″ on a side. Mark a folding line one inch in from each of the four sides and parallel to it. This will give you a small square in each corner of the flat and a large one in the center of it. From each corner of the flat draw a diagonal of each small square. Cut out the flat and cut on these small diagonals. Crease and fold on the lines of the central square, which is the bottom of the pin tray. When you have bent the sides to the right angle for a tray, paste the crossed points at the corners. When dry, clip off the points level with the sides. Plan the ornament carefully, in colors, but draw it upon the object, freehand, holding it in the position shown.

A CANDY BOX of paper or card. Let the box be "fancy," — hexagonal in shape. The basic form, the hexagon, is drawn with the compasses, and is explained elsewhere. Lay out the box as here shown. Cut on the heavy lines, fold on the dotted lines. Paste carefully the rectangular laps, bring them together, and let the paste dry. Then paste the triangular laps on the inside, paste thinly one side of the hexagonal bottom, and press it downward inside on the triangles. When the box is dry, make a cover to fit it. The flat is precisely similar to that for the box, only the hexagon is to be pasted on to the triangular laps to form the outside of the cover. Make an appropriate decoration for the top of the cover, using any Christmas symbol, geometric or other. Color the entire outside of the box in tones of one color, related according to a scale of values. A Saracenic star is employed in the diagram.

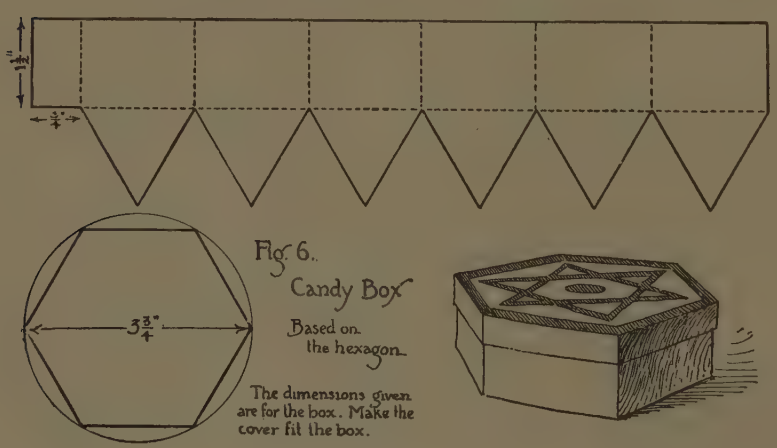


Fig. 6. Candy Box Based on the hexagon.

What do you know about the Saracens and their occupation of Spain? Perhaps you have visited their matchless Alhambra palace. Mohammed, founder of their religious system, in the first zeal and purity of his holy passion, held the artists to high ideals. For one thing, he forbade them to employ any units based upon floral or animal form; and so they had nothing left but geometric motifs; how they glorified these, the Alhambra tells.

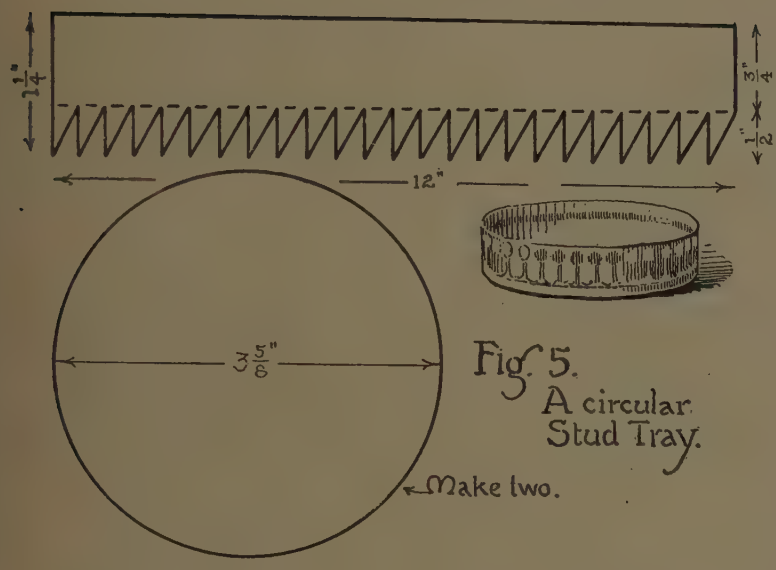
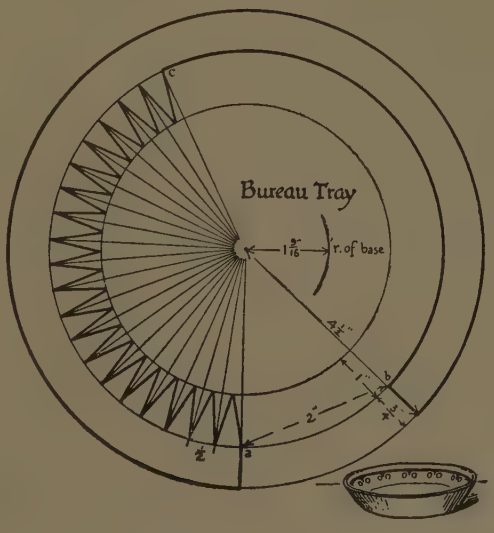


Fig. 5. A circular Stud Tray.

A CIRCULAR STUD TRAY. For this tray cut your paper or oak tag board in a strip 12″ long and 1¼″ wide. Rule a light line ½″ from one long edge. Set off on this line and edge dots ¼″ apart. With this line on the outside, fold the paper carefully on it. For stiff stock score the line before folding. With scissors cut free-hand from dot to dot, as shown in the upper part of the illustration. Bend the strip into a circle, with the points on the inside, and lap the ends exactly ½″. Paste securely. This will be the sides of the tray. Draw with compasses two circles each 3⅝″ diameter, and cut them out with great exactness. One should fit tight when pressed down within the fringed band forming the sides, for the inside bottom of the tray. Cover one side of each circle evenly with good paste. Place the fringed band on one, and turn the other over and press it down firmly inside. The other circle will form the outside bottom. Be sure all the circular edges agree, all around. Make an appropriate design for the outside of the sides, and another for the inside.

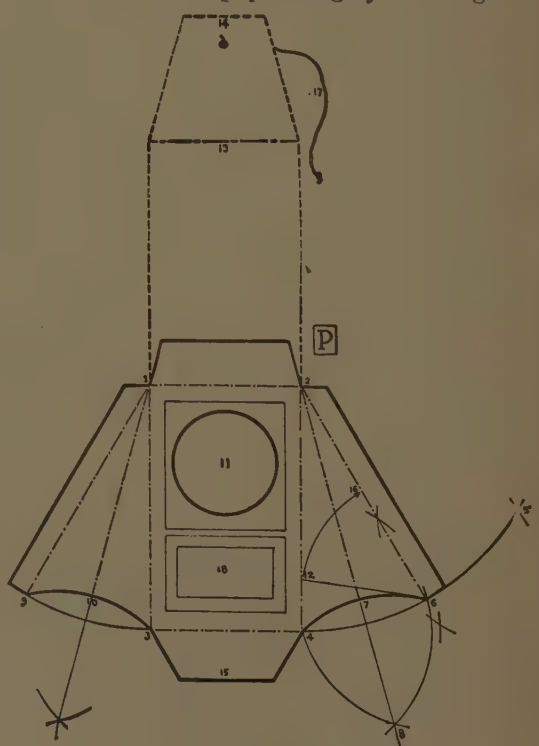
The outside design should be the more striking. The inside design should not vie with it, but rather set it off by contrast. The inside design may be merely a band of color, or a purely geometric pattern. The outer one may be derived from any appropriate element. That shown in Fig. 5 is a design suggested by the collar button. Use complementary colors, one inside, the other outside, in the design. When well thought out in form and color, draw them upon the tray. The bottom may be left undecorated except with a plain wash of color.

A BUREAU TRAY. The flat of this tray may be made of good drawing paper, or of thin oak tag. Draw the outside circle, 9″ in diameter; draw the circle for the base of the side (¾″ high), and for the points of the laps. On the second circle, beginning at point *a*, set off twenty ½″ spaces to locate the laps. From *a*, measure two inches across to *b*. Cut on the heavy lines. Bend the laps as nearly as possible on the light circle. Bend the flat until the point *a* comes to *c*. The rim will then pass around inside until the point *b* comes also to *c*, making the sides of the tray double thick. Cut from paper two circles 3⅛″ in diameter. Paste one inside, and one outside to form the bottom of the tray. Decorate with a single band of color on the outside, or none at all, and a simple border on the rim, inside.

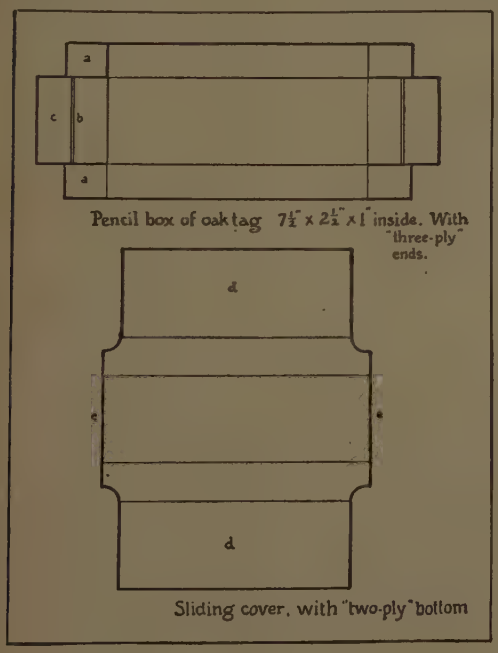


A PORTRAIT CALENDAR, shown complete in the upper picture, is easily made from one piece of paper, one piece of card, the calendar pad and the picture. The calendar pad and the picture — a portrait of a dear friend of the person to whom the calendar is to belong — will determine the fundamental dimensions, namely, those of the face of the calendar, 1, 2, 3, 4. The calendar shown opened and standing in the upper picture is to be so made that its two sides will crease inward, allowing the whole to fold flat for mailing. The tapering piece, 13–14, a part of the back brace, shown in the diagram P, with the string through it, is meant to fold inward and upward, and, when pulled down again by the string, will cause the calendar to spread open and stand securely. The paper flat is shown at P. With a radius 2–4 draw the arc 4–5; bisect it for 6; bisect 4–6 by means of arcs equal to 4–6, and from 8 describe the arc passing through 7. Repeat these points on the opposite side to find 9 and 10. Find the circle, 11, by marking in the oblong that contains it, and drawing the vertical diameter of the oblong; within this circle the portrait is to appear. Add the laps all around, the width of 15 being equal to the distance 4–12. Fifteen, when folded up against the back of the flat, is to be pasted there to act as a stop to prevent the piece 13–14 from dropping too low when pulled down to open the calendar. The widths of the other laps may be from a half-inch to an inch. Cut out on the heavy lines; fold on the dot-and-dash lines. Light lines, such as the arcs, are working lines. Get out a piece of card having the shape 3–1–14–2–4: the lengths from the line 1–2 to 13 and from 13 to 14 correspond with the lengths 2–6 and 6–12. Score this card at 1–2 and at 13 (cut it less than halfway through its thickness), and fold it backward so that in edge view it assumes the shape 4–2–6–12. Twelve indicates the lowest point to which the brace 13–14 can be drawn without becoming visible below the edge 7. Upon this card so folded, paste the portrait in the right position, and then cover the card with the paper flat, pasting down the laps, and creasing the triangles so that when 12 is folded in to 16, the whole stand may be flattened to fit an envelope. When the string 17 is pulled, 14 will pass from 16 to 12 again and stiffen the stand so that it will stand firmly on its feet. Paste the calendar pad at 18, and add such ornamental borders as seem best to complete an object, beautiful in proportion and harmonious in color. Other portraits might be substituted for that of a friend, such as a beautiful Madonna, or one of the important, because useful, men or women of the world.

Make a careful selection of the material as to color; a natural choice for the stiffer part would be some one of the shades found in the gray stock used for photographic mounts. White paper harmonizes with gray, as both are neutral. A cream paper on gray card is good.



A BOX WITH A SLIDING COVER. This may be for a glove box, a candy box or even for handkerchiefs. Think out a list of articles that need a box for their protection, and then you can decide upon the proportions of the box you wish to make. There are the handkerchiefs mentioned, of sizes for men, women or children; neckties, of the string variety, which would need a long, narrow box; and that pair of scissors which Mother values so highly, and dislikes to have others use too much, would surely be very secure in such a box. And such a box would be just the right thing for carrying things to school, such as penholders or pencils or brushes. For candy, its use would suggest a wide variety of proportions. A very short box made on these lines would keep your pens very well. Another might contain pins or paper clips for Father's desk. And slippery-elm lozenges might be carried in such a box, rather than loose in a leaky paper bag. Perhaps a most fitting selection would be a box for carrying pencils, like the one shown in the illustration, and worked out in construction in the diagram below. In designing the flat, the laps *a* and *a* were made of the right length to butt together on the inside of the box, against the end piece *b*, with *c* turned down over them to make a strong and neat end. At *b* twice the thickness



of the stock must be allowed and both lines scored to make a workmanlike edge. Make up the box before beginning on the sliding cover. Then make the cover to fit the box. Allow the ends, *e e*, to project beyond the ends of the box one-eighth of an inch. Paste *d* and *d* firmly together to make a strong and serviceable bottom. The quarter-circle cuts from the corners of the cover facilitate opening. For ornamentation, the thought may well be appropriate to Christmas, or to whatever season the contents may apply. For the birthday of the one who receives the gift, one of a great many motifs may be chosen. For while a simple treatment of border lines is very good for such a plain form, an initial letter contained within a square would add to the interest without overloading the design. Or it might be a monogram. If the family of the recipient has a seal, or has inherited a sign-of-arms, some simple rendering of this would not be out of place. Better, though, the plain monogram or initial. The long shape of the pencil itself suggests a unit to be employed alone as a central spot on top of the cover. The word PENCILS neatly done in a plain letter within an oblong would also be in good form. For a candy box, of a shape embodying a wider oblong, a single central design upon the cover might be based upon the form of some fruit, from the juices of which the candies are made. Or for handkerchiefs, in which case the box would be square, a simple geometric design.

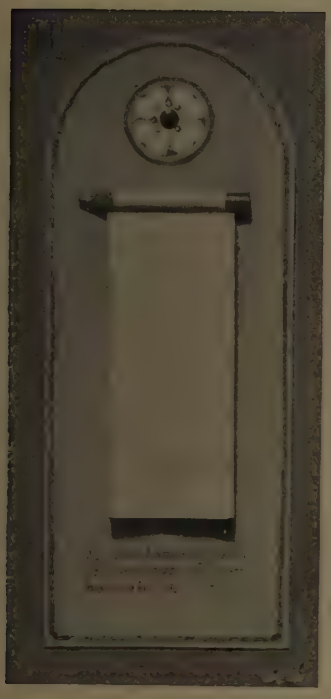
In short, it can be used either as a holder for some special thing, or as a packet-cover for a gift. To most of us, its shape recalls that of our beloved school friend of former days, the "scholar's companion"; this was made of wood or cardboard as our pennies allowed.

A BLOTTER PAD WITH STENCILED BORDER. One of the best ways of developing a border is by means of the stencil. A blotter pad for a desk is a good problem for applied design, using the border for decorating the bands across the ends. The upper illustration shows one. The bands hold the blotting sheet in place upon the foundation. For this use a cardboard back from a 9″ × 12″ cardboard. The bands may be made of bogus or cover paper or a good quality of lining canvas. Rule and cut two strips 11½″ long and 1″ wide. Rule and score a line through the middle, lengthwise, of each strip. These are for covering the long edges of the cardboard, and are to be pasted and put in place. Cut bands for the ends 2½″ × 12″. Lines are drawn and scored ½″ from each side. One-half inch space is folded over and pasted down to give a strong, smooth edge instead of a raw edge. The other half-inch space and the ends are pasted over the end of the cardboard. A 9″ × 12″ sheet of paper, to harmonize with the bands, is pasted on the back for a lining. To stencil the pattern on the end bands, cut your stencil paper 1½″ × 9″. Decide on the number of units. If four are desired, divide the strip into two, and fold one of them so as to cut two together. For three units, take two-thirds of the strip and fold in same way. Study first the right spaces between units for connecting bands. Select your unit, draw, fold and cut it, and see if the spaces between units are too great. When satisfied, trace on the bands and paint, or else paint through. If painted through, dip stencil quickly in and out of melted paraffine and press flat. Select blotter, trim to 8½″ × 11″, and keep stencil color in harmony with it.

L

A WRITING PAD with corners instead of end bands is made in the same way, the corners being built of oblongs folded around. (See Fig. L.)

You can buy these corners ready made of metal covered with a paper finish. But why not make them? Get some of the old-fashioned "tea-lead" with which tea chests are lined, or thin sheet brass. Paste upon it strong paper, and cut to the required oblong.



A MEMORANDUM PAD FOR THE HOME. The pad may be purchased for a cent or made from scraps of writing paper. The back may be made of either cardboard or wood. The sheath for the pencil is made from oak tag or other tough paper. The ornament may be drawn if on paper, or burnt in if on wood, and color added to suit the taste. If made of wood, bore a hole to hang it by.

A pasteboard COVER FOR A NOTEBOOK. Especially meant to hold the perforated notebooks, but well designed to keep clean and secure a notebook or loose leaves of any sort. This has been successfully made as a protection to school notebooks, and on one occasion two higher grades made up a sufficient number to serve for two lower grades of a grammar school building. These, over eighty in number, are still in use. The covers are made up of heavy book cover pasteboard, but you would often find the old backs of large sketching pads heavy enough. Of course there is no special limit to the size or proportions of the covers. The outside is to be covered with suitable cloth, binders' cloth being the best, but linen or even denim being possible substitutes. The covers are to be lined with paper of a tough but thin quality, and smooth of surface. The back, or binding, is of buckram. If you make it to lace on to the notebook, as in the perforated style of book, it must have four eyelet holes in the binding. These have to be punched, and you may find this a good time to buy and own a saddler's punch, as punch pliers will not reach holes far from an edge. Paste is needed, and library paste or prepared paperhanger's paste are among the best. Eyelets known as "solidhed" are a good kind. A convenient size for the cover boards is $12\frac{1}{2}'' \times 9\frac{3}{4}''$, and two narrow strips, each $9\frac{3}{4}'' \times \frac{5}{8}''$, are needed to back the eyelets. The binding of buckram is $10\frac{5}{4}''$ long, to allow for turning and pasting, and $6''$ wide. Four triangular pieces are to be pasted on the four corners, turning each under $\frac{1}{4}''$ and pasting. They are cut oblong and folded inward, where they should meet. Mark central line on binding piece, and paste covers and narrow strips in place, the last $\frac{1}{2}''$ from the line. Cover the outside with the binders' cloth, turning and pasting inside, and paste in the lining paper (over covers only, not on binding). Lastly, set the four eyelets. Spread from inside with a flathead screw, and set them with a round-head screw. Use for an anvil the hole in a piece of old hinge, tacked over a corresponding hole in a small block for the screw. Tap gently. Do not drive the eyelet through the cover.

A BRUSH BROOM HOLDER decorated. This holder should be made to fit the particular broom meant for it, as otherwise the broom might slip through. For materials, a wide variety will serve. Think where the broom is to be used. If in the Mother's sewing room, cardboard covered with bookbinder's linen or buckram would be appropriate. If in the entrance hall, where it is most likely to be found, leather or leatherette that will stand harder usage is better. Perhaps the coachman needs one in his closet, upon the door, and here a stiffer leather, like thin sole leather, would suit the purpose. A very beautiful holder could be made of this material, worked out with a good design in leathercraft or even in simple cutting out, like a stencil. The Mexicans, those masters of leathercraft, make beautiful flower forms by judiciously cutting and raising a thin section of the leather, and while soaked with water molding it and further cutting it into the desired shape. Plain cardboard may also be used for the holder, and this is the best of all for the beginner. It may be white or tinted. The design which is to be placed upon it will constitute its chief attraction. Design the shape of the back, which is to be against the wall, on lines generally following those of the brush, which are radiate. In the elaboration of it there is room for fine play of imagination and good taste. In the top space there is place for the application of considerable historic motif. In the left-hand illustration there is a strong suggestion of the papoose cradle of the American Indian, and therefore decorative schemes adapted from one of these would probably fit well into this form. Greek ornamentation offers many suggestions, beautifully simple and fitting. It could be made in the style of any of the successive steps of the great historic schools of ornament. The Greeks and Romans loved so to design and ornament their commonest implements that these were a joy to the eye as well as a comfort to the hand.

In the right-hand illustration, the design follows the structural lines of the object, emphasizing the oblique sides of the back and the horizontals of the holder. A simple scheme could also include simpler lines to reënforce those of the holder portion, with a central unit filling the space generously. Perhaps most pleasing of all is the floret designed to fill the space. When the brush holder is made of cardboard and covered with buckram, a unit of this type may be made very beautiful in the simplicity of its design and the selection of the colors. The color scheme should present tones from one color, the same color as that which determines the general tone of the wall upon which the holder is to hang.

This holder could also be made of sheet metal, in brass or copper. The tones of the wall should of course be considered. Here a pattern appropriate to metal should be employed. Let the pattern harmonize if possible with the design of the wall paper, or the wainscot paneling, or the specially designed corner block of the window casing near which it may hang.

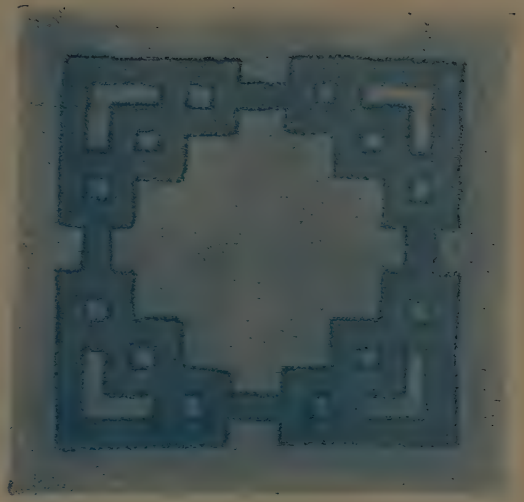
A WORK BASKET of a useful and beautiful type may be made by cutting from stiff cardboard the necessary pieces as shown in the upper plate, covering them with paper or cloth in such a way that the covering material forms the hinges which attach the sides to the bottom. A conventional unit may then be designed and stenciled upon the outside of each section and the sections may then be tied into place with raffia or ribbon. Another satisfactory way to fasten the parts in place is suggested at A in the plate. A row of holes is punched along the upper edge and all the parts are laced together by a double lacing of raffia or ribbon of harmonizing color.

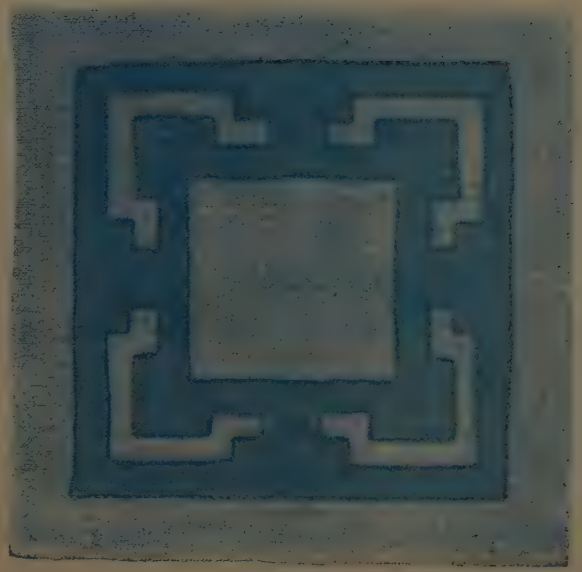
A LAMP SCREEN decorated with a stencil in colored crayon. This screen made of small picture frames with the glass removed has panels of grass linen, fastened in place with tiny tacks after having been decorated. The design shown here is of candytuft. The leaves and stems are dark green and the flower petals violet. A crayon color is highly commendable for decorative stenciling; for while with liquid colors some repeat of the motif may "run" and spoil the whole, with the little dry stick of color in one's hand all uncertainty is avoided. For the stencil, a heavy gray paper of the kind formerly used in libraries for book covers is preferred by many. For cutting, a small, sharp pair of scissors, wherever they can be used to advantage, is better than a knife. A smooth board is necessary; the material is laid over it and the stencil lightly tacked in place with thumb tacks. The color is then rubbed into the spaces. For deep shades, the crayon may be worked back and forth, crossing and recrossing. For stems of flowers and long, thin lines, it is well to sharpen the crayon a little on a piece of wire netting, as this will prolong the life of the stencil. After the rubbing on of the color comes the most important step in this process. The treated fabric must be smoothly pressed with a very hot iron. Have the goods perfectly smooth, place the iron on it for one second, lift the iron, rub it on a cloth which you will have beside the board for that purpose, place the iron on another portion of the design, and so on till all is done. Do not push the iron from side to side until you have been all over the design according to above instructions. This is to set the color. Before pressing, the work will look a trifle crude, but when the hot iron touches it, the color sinks into the threads and seems to become a part of the material. After the first careful pressing to set the colors, the work may be ironed in the usual way, and at any time it may be washed and ironed. The colors will be found to be fast. Paint in the form of crayon is peculiar to the white man.

A PAPER BIRD IN A PAPER CAGE. This object, while a toy, will be found no mean practice for those who would like to make the object shown lower on this page, namely, a lantern, of a type which was once pronounced "lanthorne." To design and then develop (cut out and paste together) such an object as this bird cage calls for thought and accuracy of workmanship. There will be needed one sheet of paper, and if for little folks, of the kind that comes ruled in squares. Half-inch squares are best for this object. The sheet is to be 12″ × 18½″. Have another sheet 9″ × 12″. Each side of the cage has four long and narrow openings to show spaces between the bars. Cut the four sides, each with its triangular side of the roof, and a lap for pasting, on one edge of each triangle. Cut off tops of these triangles about half an inch down. Leave also a strong lap on the bottom of each side, to attach the sides to the bottom. Cut the bottom a square 1⅛″ larger all around than the square of the folded sides. This will give a broad base for the cage. Cut out the bird and paste its feet upon a narrow strip for a perch, secured to the inside. Fasten on the bottom by tucking the laps of the sides through straps made in the bottom by cutting parallel slits. Add a loop to hang it by.

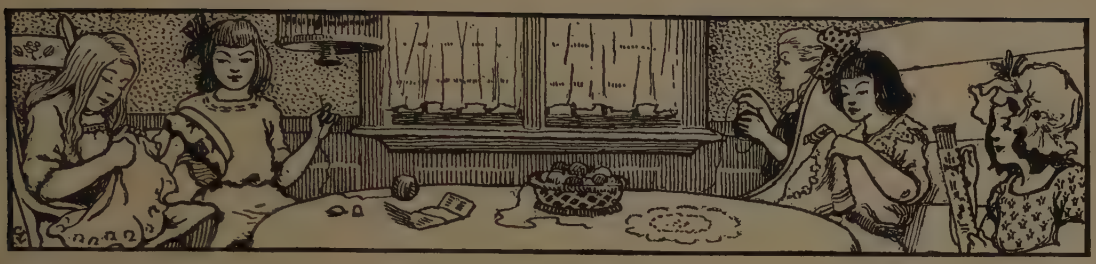
The LANTERN, designed for sheet metal, should be laid out upon oak tag. Plan its three, four or more sides as divisions of a circle, and project the sides from this. Design the decoration, which may be of holes punched with a sharpened wire nail over a board, or cut out as stencils to be glazed with ground glass. The dragon fly shown here is an appropriate motif, as insects love a light. Leave one panel for a door if it is for a candle or oil lamp. If for electricity or gas, make all sides closed. The top piece, or roof, is composed of triangles whose bases are spaced off on the arc of a circle. If the roof is to overhang, make this circle larger than the first one. Unless ventilated by patterned openings, if it is a hand lantern the pyramidal roof must be raised upon soldered laps or brackets to allow the air to escape. In cutting the door opening, leave four laps long enough to be rolled around a large wire, and cut the door from a separate piece, with three other laps to roll and fit between these, thus forming the hinge. The door should be larger than the opening. Secure the hinge with a pin of the same metal wire, with an eye at the top. Fasten the door with any sort of hook, hasp or catch you may prefer. For metal, 27-gauge brass is good, costing about 30 cents a pound. It will require about two and one-half pounds. The shape of the bottom piece will depend on whether the lantern is to be used for carrying, or as a porch lantern, illuminated by gas or electric current.

The desirable motifs for decoration call into line a great variety of units. The insect world offers many of fascinating shape.





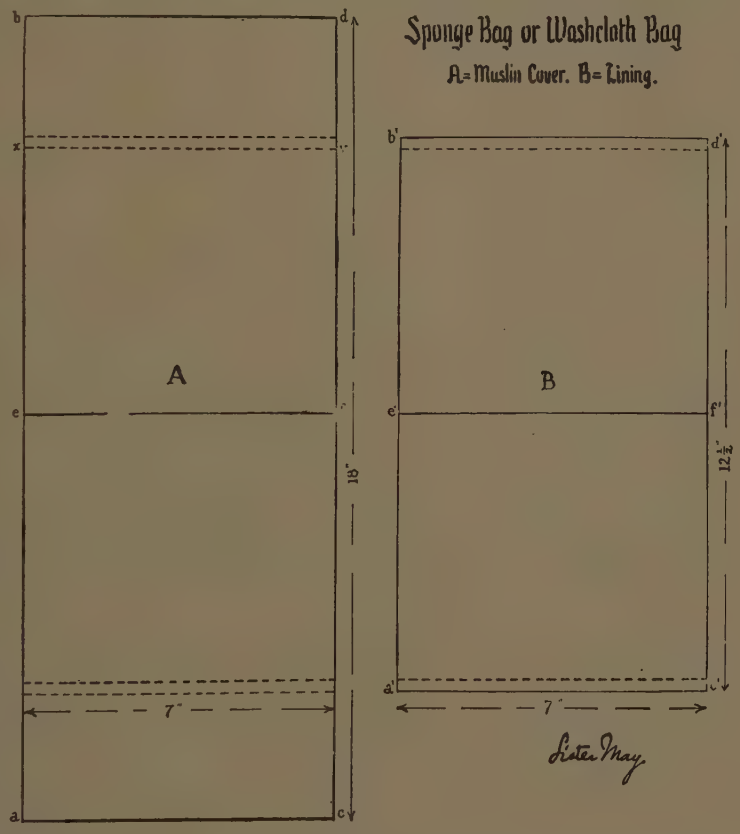
EXAMPLES OF COLOR HARMONIES WORKED OUT BY CHILDREN UNDER FOURTEEN YEARS OF AGE. SEE PLATE AT PAGE 183

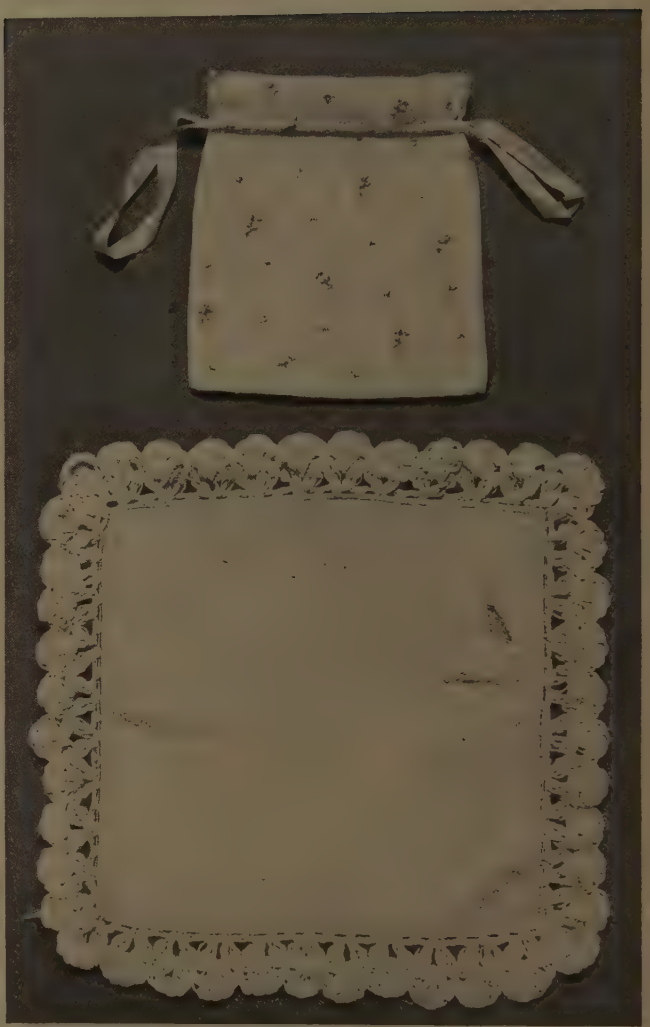


NEEDLEWORK

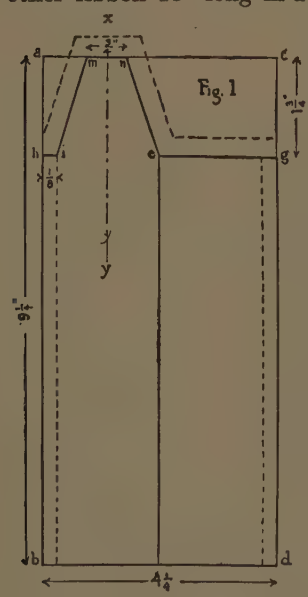
WHO has not pleasant memories of the fair little girl who sat under a tree sewing as long as her eyes could see? A picture of home is hardly complete without a woman sewing in it. The stories of chivalry would lose a part of their charm if from them the fair ladies working bright figures in tapestry were to be removed and sewing machines put in the place of needles! Sewing is a form of handicraft that even boys should know something about. What would Robinson Crusoe have done without the ability to sew? Many a boy has found, when off in camp or away to school, and many a man discovered while traveling, how useful an art sewing is. One ought to be able to sew on buttons, to darn stockings, to mend a tear, and to make a cloth bag, at least. But sewing like any other craft becomes a pleasure only through practice until some degree of skill is attained. And even then the craftsman has but a fraction of the pleasure he might have, unless he is able to make his work beautiful as well as useful. One does not long enjoy producing merely commonplace things. It is an inspiration to good work to know that common objects need not be commonplace. Take for example such objects as a traveler needs. Here is a whole set of such objects, all having possibilities in the direction of the beautiful. Have courage to start such a set. A simple object easily made comes first, the more difficult ones later. Your skill will increase as you proceed, and your pleasure in what you are doing will grow with the visible results. Only do not hurry, do not allow yourself to feel hurried. Having begun the good work, do only so much upon it each day as you can do thoroughly well. Let your rule be that of Nature itself:

"Without halting, without rest
Lifting better up to best."

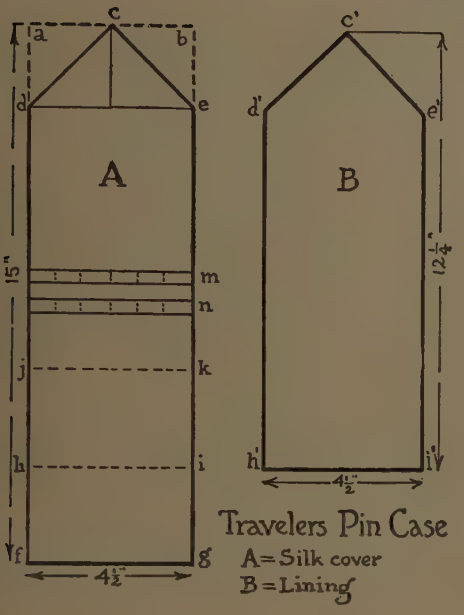




SPONGE BAG OR WASHCLOTH BAG, the WASHCLOTH and a TOOTHBRUSH HOLDER, of a set of traveler's articles for a person going to Europe. Materials: dotted Dresden muslin, in a rosebud pattern of pink and green, lined with stork sheeting. The finished articles are also pictured. Cut lengthwise a strip of muslin, A, 18″ long and 7″ wide. Cut a strip of stork sheeting, B, 12½″ long, and 7″ wide. Fold *a* on *b* and *c* on *d* with the wrong side out and sew the edges together with a ¼″ seam. Turn the bag. Fold *a′* on *b′* and *c′* on *d′*, wrong side out, and sew the edges together with a ¼″ seam. Fit the lining inside the muslin bag, *ef*, corresponding to *e′f′*. Turn in the top and with a hem of 1½″ sew the muslin on to the lining upon the dotted line *xy*. Three-eighths of an inch above this line stitch again, making a place for the draw ribbons. Draw in at *x*, around the bag and out at *x*, a ½″ ribbon 20″ long. Sew the ends of the ribbon together. Draw another ribbon 20″ long in at *y*, around the bag and out at *y*. Sew the ends together, and the bag is finished.

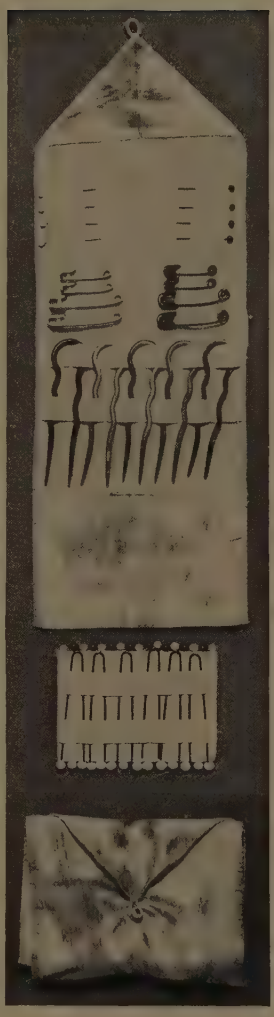


The WASHCLOTH was made of a 10″ square of Turkish toweling, neatly hemmed and bordered with a double crochet and scallops made with cotton yarn No. 20. Another durable material is the "rubdry" toweling, which is becoming almost as popular as the Turkish. And surely it is not out of place to remind the younger travelers that any washcloth should be daily aired. The TOOTHBRUSH HOLDER requires a strip of stork sheeting cut lengthwise, *abcd*, 9¼″ long × 4¼″ wide. Cut the top like the diagram. Cut the outside the same, but allowing ⅜″ at the top as per dotted line. Bind the top of the lining, *l*, *m*, *n*, *e*, *g*, with English twilled tape. Hold *hk* on *gd* and sew across the side and bottom on the woven side. In like manner stitch the outside and turn. Fit the lining to the outside. Turn in and fasten the muslin with blind stitch to the binding, leaving enough of the binding out to show like a cord. At *x*, sew a loop of white silk rubber cord, a pearl button at *y*.

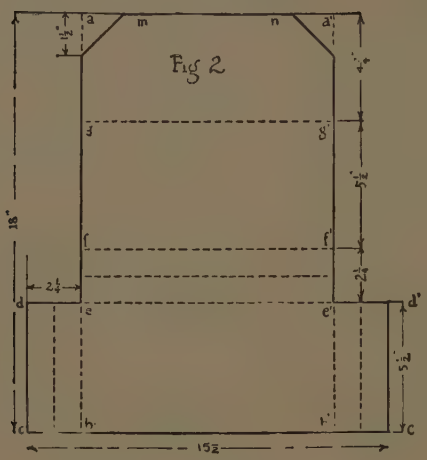


Traveler's pin case. One of several articles for a traveler's general outfit. For the Pin Case, for material it would be well to use flowered ribbon in pink and white lined with white French twilled flannel and bands of half-inch pink ribbon. Ribbon is 16″ long. Fold *a* on *b*. Sew *ca* and *cb* together in ¼″ seam. Press open the seam and arrange to form triangle *dce*. Turn ½″ hem at *fg*. Baste ¼″ fold on each side of lining, *d′* to *h′*: *e′* to *i′*. Cut along lines *d′c′* and *c′e′*, forming triangle like *dce*. Overcast *h′i′*. Adjust lining to outside. Slip triangle *d′c′e′* between folds of silk *dce*. Hem *dc* on to flannel lining. Fold *f* on *j*; *g* on *k* to form a pocket. Sew over and over lining to outside from *d* to *h*; *e* to *i*. Adjust ribbon bands at *m* and *n*. Stitch vertically, as indicated by dotted lines, forming spaces for hair-pins. The other pins attach to the flannel lining. Finish with a buttonhole-stitched loop at the apex of the triangle and button 6½″ from the apex, to hang it by if desired. The pocket contains a card with more pins.

It is made of two pieces of cardboard or calling cards 2¼″ × 3¼″. Cover one side of each with silk 3¼″ × 4¼″. Fold the edges over the cardboard. Draw the opposite sides together with long stitches. Adjust the ribbon bands. Stitch across vertically to form spaces for hair-pins. Sew the two pieces of cardboard together, over and over. This forms a place to fill with pins. A pin case may seem an unimportant item for a traveler. Consider what a pin means. It may save your dignity, when it takes the place of a suspender button gone astray just as you expect to deliver your part in a ship's concert, or at a hotel party. It may preserve your modesty when it prevents a bare knee or elbow from sticking through a sudden rent. It may help to retain your health when the raw wind has demanded admittance to your chest by way of a collar that will not stay turned up. Or it may even save your very life, by holding together the bandage applied to a bleeding cut. All this we may owe to the common wire pin, not to mention those variations of the pin family such as are shown in the actual picture of the Pin Case. Consider the ways of the safety pin. In its infancy it secretly holds down Sister's collar at the back, and in its gigantic adult vigor it grips the folds of the horse blanket like a vise. In the form of a brooch, what security it gives to the loveliness of a gem. The common pin, over-trusted in certain places, is like faith without works, where the safety pin is a sure foundation. But the pin may innocently lead to slovenly habits, for, allied with a tendency to saving, it may appear in groups or rows upon the hem of the gown or on the breast. The case does away with all that.



Two Cases for Rubbers.



Two cases for rubbers. The two shapes are different, and illustrate the fact that we may often get the benefit of mental and manual exercise by the use of two or more routes in reaching the same goal. Fig. 2 is made of stork sheeting, and decorated with the stencil. Fig. 3 is made of Dresden muslin lined with stork sheeting. Fig. 2 is made thus: Cut a strip of stork sheeting lengthwise like the diagram, *ab* being 18″. *cc* is 15½″; *cd* is 5½″; *de* is 2¼″. Bind *cc* with tape or binding ribbon. Hold *ed* on *ef*, also *e′d′* on *e′f′*. Sew a seam on the outside. Crease the case on lines *eb* and *e′b′*. From *k*, sew binding on *ke* across seam *ef*, *fg*, around *g*, *a*, *a′*, *g′*,—seams *g′f′*; *f′e′* and the folds *e′b′*. Sew on loops at *mn*, and buttons to correspond at *x* and *y*. Crease the case on the dotted lines and fold inward, to make flat when not in use.

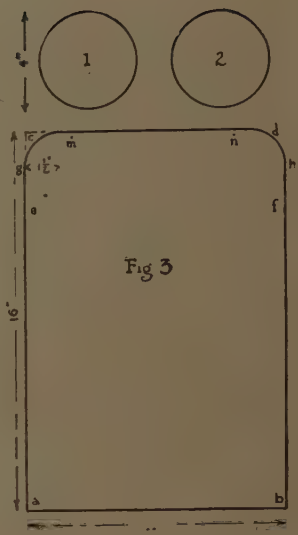
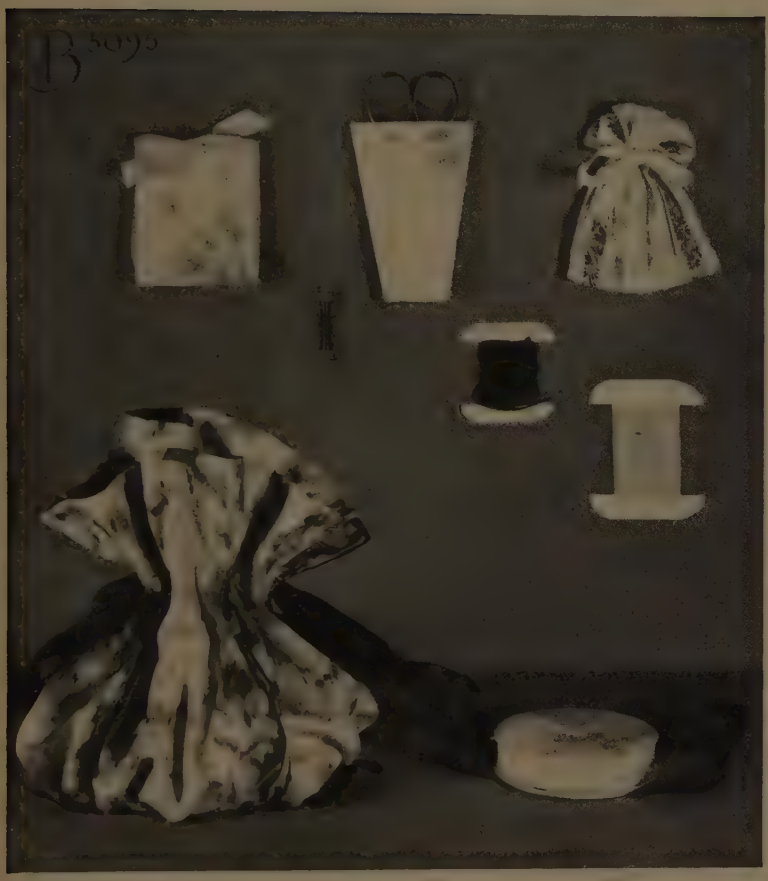
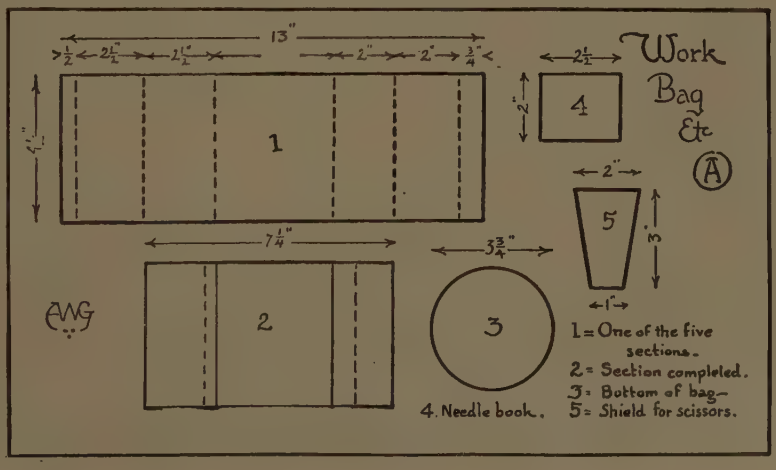


Fig. 3 is made with lengthwise strips of muslin and stork sheeting 16″ long and 11″ wide. Two circles each of muslin and sheeting, 4″ in diameter, will form the ends. Round the corners as in diagram. Bind stork sheeting across end *ab*. Begin at *a* and sew *ae* on to circle 1, *bf* on to circle 2; seam on the woven side of sheeting. In like manner put the muslin together, seams on wrong side; turn; fit the lining; fasten together by binding the end *e g h f*. Blind stitch *ab* on to binding of the lining. Finish with loops of white silk elastic at *m* and *n* and adjust the buttons. In selecting the goods pattern, or putting on your own decoration, be sure it is not out of keeping with the contents. This is one of the most useful of the utility presents. For no matter how clean the rubbers are brushed, no one wants them against clean things in the baggage.



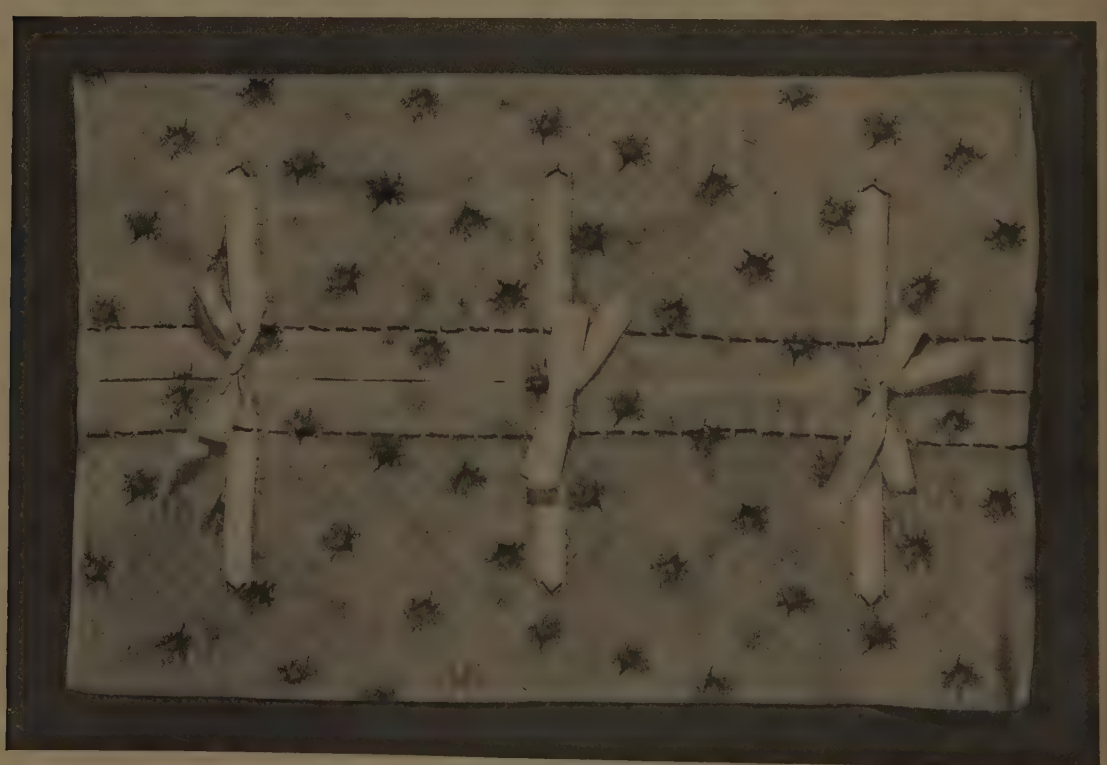
A SEWING BAG. Cut five 13″ lengths of 4½″ ribbon of the Dorothy Dainty style. Ribbon with a dark serpentine border is effective in the finished bag. Cut two circles of silk 4½″ in diameter; two circles of light-weight cardboard 3¾″. See Fig. A. To make: Over-and-over the five strips of ribbon together. Make ½″ hem on the lower edge. Fold again 2½″ in depth to make pockets. Fold over the upper edge of the bag ¾″. Fold again 2″ in depth, for the ruffle finishing the top of the bag. Hem or stitch this down. Stitch again ½″ above, making space for the draw ribbon. Make two buttonholes in this space on the outside. Adjust ¾″ draw ribbons, each 1 yard long. For directions, those for the Sponge Bag will suffice. Gather the lower edge of the bag. Gather the circles of silk ¼″ from the edge. Fit to the cardboard, drawing up the thread and fastening on the wrong side.

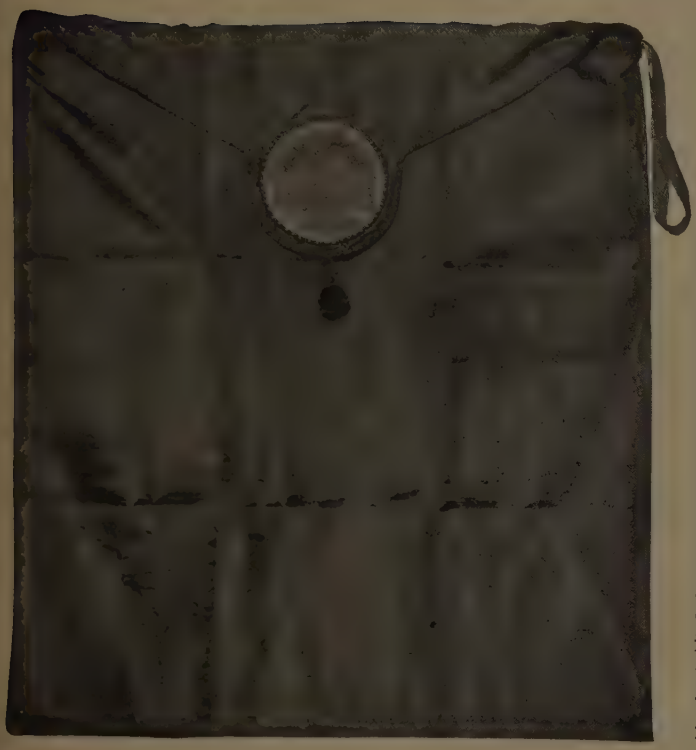
Over-and-over two circles together. This affords a pin ball for the completed bag. Over-and-over circle to the bottom of the bag. Some of the contents of such a bag are shown in the illustration; there is the needle-book, at the upper left, the scissors-case or shield, a button bag, shown at upper right hand, bobbins wound with colored silk, skeins of cotton, the case for tape and ribbons lying to the right of the Work Bag, and, though not shown, the glove darner and skein of particolored threads are handy to meet any emergency. Needles and pins of all sizes must not be forgotten. Do not crowd the bag, but for repairing articles like gloves, a pair of the tiny "stork" are above price.



A CASE FOR BLOUSES. This is meant to hold two waists, but can be made to hold more by making the two pockets larger. For materials Dresden muslin of the dainty rosebud pattern is appropriate, but the pattern should be of larger units than when the same material is used for the smaller articles for travelers, such as the toothbrush holder described elsewhere. The muslin must be 31″ long and 22″ wide. Six pieces of ⅝″ pink ribbon, each 15″ long, will be needed for the ribbon fastenings. To make the case, first turn 1¼″ hems on each side or of such widths as will bring the dots on the edge of the hem. Fold over the ends to form pockets 7″ deep on each end. Over-and-over the ends of the pockets. Attach the ribbons as in the diagram. Cover the row of dots in the muslin at the edge of the hem with pink twist or embroidery silk. Connect the dots with the Kensington outline stitch in green silk. This hem may be simply hemmed or hemstitched, or finished with a cat-stitch or feather-stitch. With three dots in pink silk fasten the pointed ends of the ribbon. Connect the dots with outline stitch in green. The case should be folded after packing, bringing the two halves together. It could be adapted also to carrying a broader single garment, in which case it would be used without folding. A gift of two waists could be given in no prettier package, thus showing something of the giver's handiwork from the time the wrapping was undone to the moment when the waists were disclosed, perhaps bearing further evidence of the giver's skill in embroidery. Surely no more practical gift could be offered, for the shirt-waist is one of the utilities which defies the arrogance of fashion, and refuses to begone. On the contrary, it has made Dame Fashion its handmaid, and has called into its service her most delightful craft, that of the embroidered pattern. There are shirt-waists of low degree and of high, but in kitchen or reception room, on the lawn or street, they are always in good taste. What an adaptable garment! How did the housewife ever get along without that variety known as the "Johnnie Jones"?

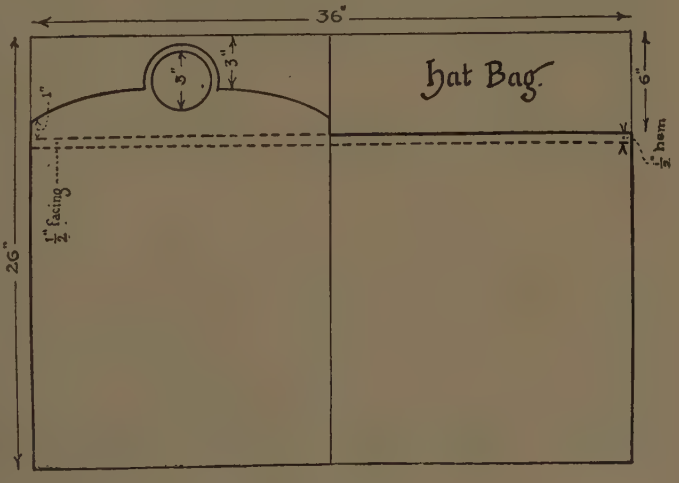
It has been hinted that "mere man" has worn them in the guise of the summer shirt, and Postmaster Uncle Sam has come out "flat-footed" in defense of this summer comfort.

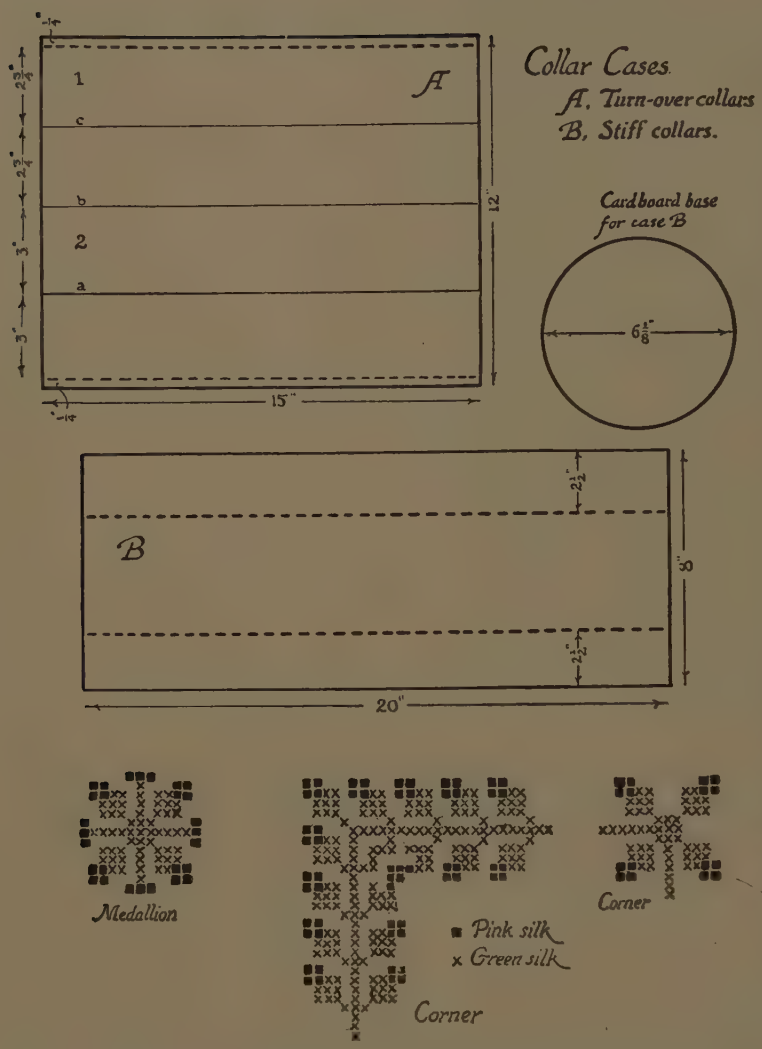




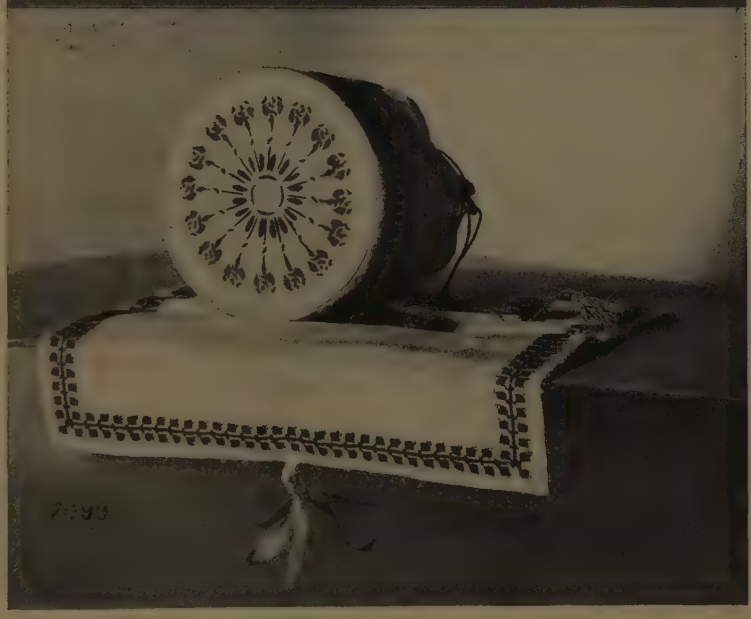
A HAT BAG. For a woman's hat, and should be made of colors corresponding to the traveling suit. The bag shown herewith was made of India silk in green and buff. It requires one yard of green for the bag, 26″ wide; a 6″ square of the other color silk (or linen canvas) in buff; 4 yards of green silk cord, ¼″ in diameter; one skein fine green embroidery silk; two spools of buff silk twist. Sew the ends of the silk together in a French seam, making one side of the bag. Seam the bottom of the bag. Cut top like diagram. For the applied medallion a handsome initial or monogram is appropriate, to be done boldly in simple outline stitch, so as to be effective on a darned background. This one shows a stenciled pattern of a bird, suggestive of travel, after the Japanese. Cover the background of the medallion with green embroidery silk, over two threads, under two threads, alternating on next row. Before gathering, cut out triangles in the overlapping edges of the canvas, that this, the heavier material, may not be too bulky. Place the medallion. Finish with silk cord couched with the buff silk twist. Next, face the edge of the lap. On the edge of the lap couch the cord. A loop of cord in the lower center of the circle may be left to which a silk tassel or ball may be fastened. Finish the top of the other side of the bag with a ½″ hem for the drawstrings. Provide for the drawstrings on the rest of the top with a ½″ facing of silk. Use cord for drawstrings. These may be finished at the ends with tassels. This bag, with its materials of Oriental silk, and the circular medallion after the style of the Japanese, strongly suggests the handiwork of that nation of marvelous craftsmen. The circle is very like the family seal of the old time samurai aristocracy, which was employed judiciously as a decoration, and never lavishly. It was worn especially as a single spot of decoration upon the outer silk garment of the male members of the family, and may be ranked with their famous two swords as a mark of the high birth of the wearer.

It vied with the "sword knot" in which the silken girdle-cord of the wearer was tied, as an index to the family line. The embroidering of it was an act of religious devotion for the worker.



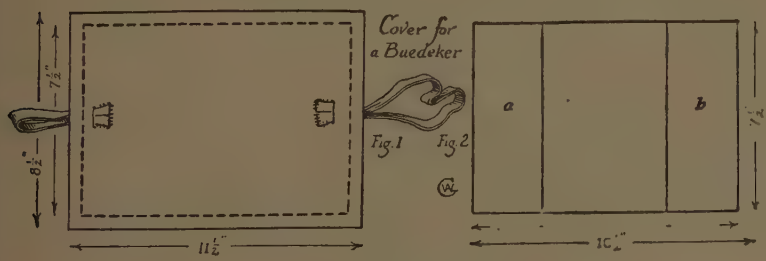


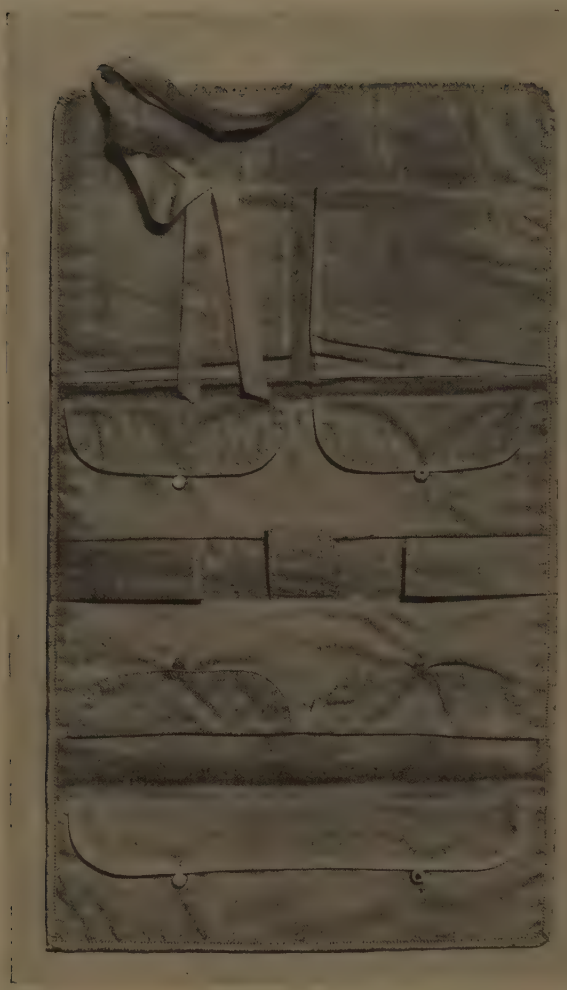
Two COLLAR CASES. The materials for model A are white mercerized cotton, basket weave, 15″ wide, 12″ deep. It is lined with Persian lawn with an interlining of sheet wadding. One of light-weight cardboard is also used in spaces 1 and 2. Make the width of the case correspond with the size of the collars. Cut cloth of somewhat indefinite width to allow for adjusting the embroidered pattern, that the margin around the case may be the same. The pattern is a conventionalized rosebud in pink and green filo silk. If the material is too fine, baste on Penelope canvas. Stitch across the case at *a*, *b*, *c*, *d*, or feather-stitch with pink silk on the lining. To make Case B use a strip of round thread imported creamy white linen, 20″ long and 8″ wide; a circle of linen 7″ in diameter; lining silk, old rose, same dimensions; two circles of cardboard 6⅛″ diameter; and one 21″ long and 2½″ wide; twelve jade rings, 1½″ diameter, or brass, covered with crochet cotton; two yards of silk cord; four tassels. On the lower edge of the linen is a pattern stenciled in green and rose; cover one circle with it, adapting the stenciled pattern to it. Cover the other circle with lining silk and over-and-over the two together. Seam together the upright portion, line with silk, seaming upper edges on wrong side, turn and sew lower edges, folding together with a blind stitch. Over-and-over this to the circle on wrong side. Turn. Insert between lining and outside the 2½″ strip of cardboard, by ripping lining seam. Hold cardboard in place by stitching. Sew on the rings 2″ from top. Run through them two silk cords of old rose, each 36″ long, finished with four tassels. To adjust draw strings, see instructions for making Sponge Bag. To make cord and tassels use Asiatic Twisted Embroidery No. 2240. One skein makes one yard of cord. Two persons at opposite ends twist the silk until it readily kinks. Then fold the silk so that there are three strands, — three making a prettier cord than two. Hold the ends with great care till the strands are adjusted. Twist in the opposite direction and fold with three strands. The finished cases are shown on the next page. This simple article does not require intricate mental processes, but it does require a mind intent upon good, plain work, well performed. Without this, even the simplest things are unsatisfactory.



A GUIDEBOOK COVER. The material is heavy firm linen in the natural color, stenciled in two shades of green, harmonizing with a woman's traveling suit, or to suit the owner's taste. It will save many a ragged edge and bruised corner. Cut the canvas 11½″ long and 8½″ wide. Cut a similar piece for the lining. Cut two pockets 8½″ long, 3¼″ wide; a strap 32″ long, ⅞″ wide. Turn over edges of the outside cover, ½″ deep. Cut out the corners. Press with hot iron. Turn in edges of strap, making it $\frac{7}{16}$″ wide, and stitch twice across. Cut slots as per diagram after basting a piece of linen underneath for strength and stitching each side of the prospective slot. Buttonhole-stitch the slot. Adjust the strap, leaving a loop of 2½″ on one side, 6″ on the other, and a single strap extending across the inside of the cover. Line, cutting out the edges beneath the pockets. Hem one side of each pocket. Turn in edges and baste across the ends of the cover. Stitch around the cover $\frac{3}{16}$″ from the edge.

Going abroad without a guidebook is like visiting a picture gallery without a catalogue; in either case your information is not readily digested, and is apt to remain somewhat jumbled in your mind. It is a good plan to follow the method of one traveler who always made his own comment notes on the margin of his Baedeker and often drew tiny sketches to fix the place in his memory. What is true of the Baedeker in Europe is also true of the Baedeker or Sweetser in America. The book seems more your very own.

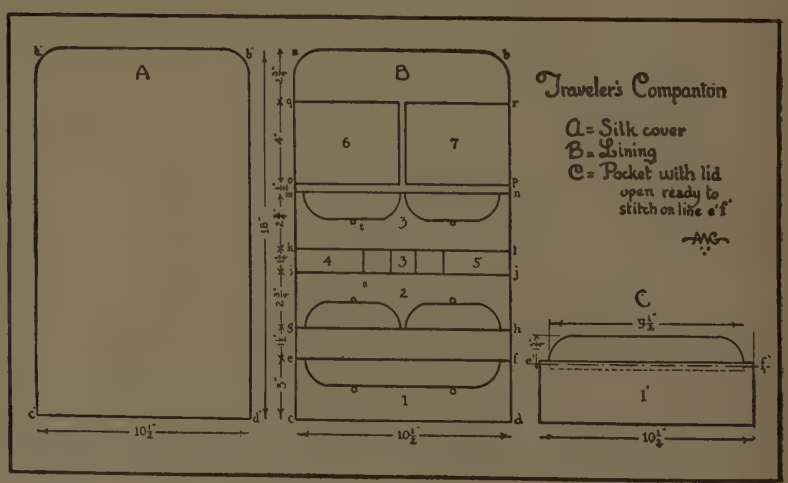


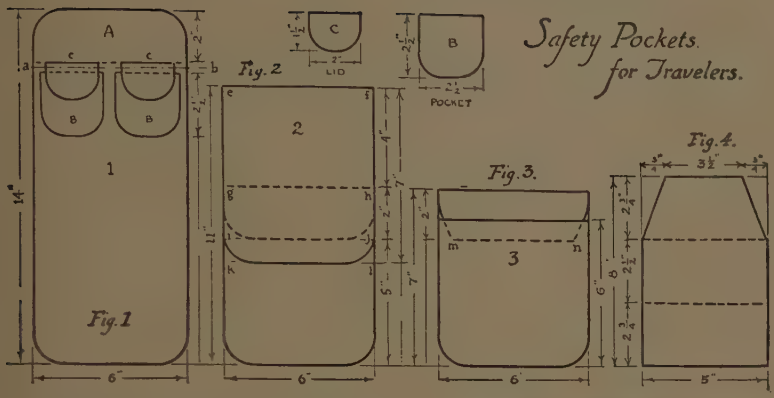


corresponds to *ef*, *gh*, *mn*, the horizontal opening of the pockets. Pockets 4, 5, 6, 7 have a vertical opening towards the center. Bind one side of pockets 4, 5. Baste binding on three sides of pockets 6, 7. Stitch the included side only. Bind the pocket lids on each side, except the straight one. Bind the longer sides of the strap. Indicate on the lining lines *ef*, *gh*, *ij*, *kl*, *mn*, *op*, *qr*. The figures on diagram B locate them. Arrange the lid of pocket 1 as in C. Stitch on line *ef*; ¼″ allowed for seam. Turn back to position. Adjust lids same way on pockets 2 and 3, two on each. Lay a box pleat in pockets 4 and 5, making the width 1¾″. Adjust to the lining the opening at *st*, the sides extending ¼″ beyond lines *kt* and *is*.

In the same way adjust pocket 5, and the strap in center of the space at lower 3. Seam pocket 2 on line *ij*; pocket 3 on line *kl*. This stitching also fastens sides of pockets 4 and 5 and the ends of the strap. Lay box pleat in pockets 6, 7, reducing width to 4″. Adjust on lining with vertical opening towards central line *xy*, sides on lines *op*, *qr*. Stitch the lines. Fasten loops of white silk elastic cord on the lids of the pockets, buttons on the pockets. Pockets 2 and 3 may be divided by vertical stitching along line *xy*. Fit the completed lining to the silk cover. Bind with ribbon. At *x* fasten ¾ yard of ribbon.

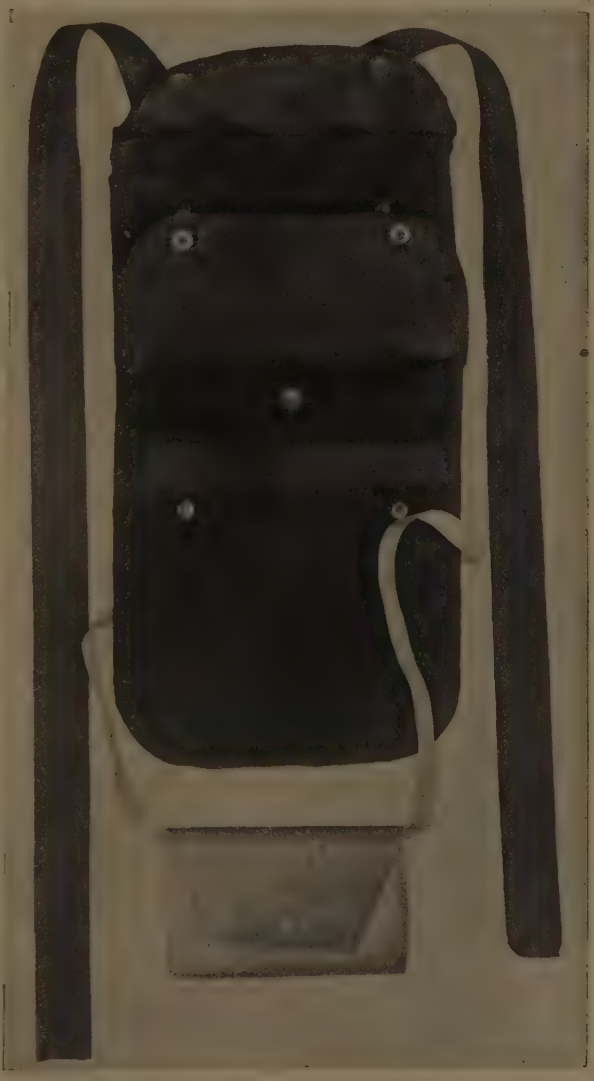
A TRAVELER'S COMPANION. Cut plaided silk cover 10½″ × 18″. Stork sheeting lining, 10½″ × 18″. Round two corners of cover and lining. Cut pockets 1, 2, 3, 10½″; pockets 4 and 5, 3¼″ × 3¼″; pockets 6 and 7, 5″ × 5″. Cut one pocket lid, 9½″ × 1¾″; cut four pocket lids, 3¾″ × 1¾″; one strap, 3″ × 1¼″. Stitch white binding ribbon on one side of pockets 1, 2, 3. The bound edge



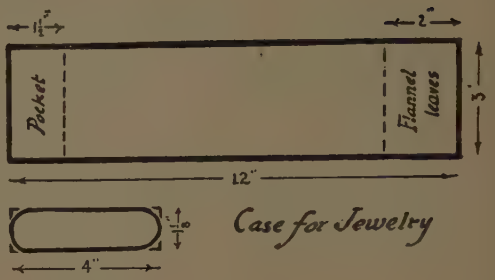


SAFETY POCKETS FOR TRAVELERS. The first of leather, the second of linen. Cut a strip of kid 14″ long and 6″ wide. Round the corners. Line with silk, turning edges in. Stitch around lid A. Cut two pockets, B, 2½″ square, rounding lower corners, and stitch as shown. Cut pocket lids, C, 1½″ deep and 2″ wide. Turn lid A on dotted line. Stitch on *ab*, including lids C. Cut strip of green taffeta silk (2). Baste on strip of kid *ghij*. Cut a strip of kid 7″ × 6″. Line part corresponding to *ghkl* with silk and stitch edges. Adjust this to silk (2), upper edges corresponding. Stitch on *gh*. Cut silk strip 7″ × 6″ (3). Apply kid strip 6″ × 2″ to upper part, cut as at *mn*, stitch, and place 3 upon 2, lower ends corresponding. Stitch sides and base, making inside pocket. Cut strip of kid 6″ × 6″. Line with silk, turn in edges. Stitch across top. Apply to 3, lower edges corresponding. Stitch 1, 2, 3, together. When completed, there is the long pocket, length of Fig. 2; middle pocket, length of Fig. 3, its lid buttoning on narrow kid on *gh;* and outside pocket, with *ghlk* for a lid. Buttons should be brown, and fasteners are ball and socket, glove style, or dress style sewed on. For pocket No. 2 cut a strip of butcher's linen 8″ long and 5″ wide. Cut off the corners of the lid as shown in the diagram, Fig. 4; turn in the edges on all sides; line with thin linen or Persian lawn; stitch; fold to make a pocket 2½″ deep. Ornament the lid with large dots heavily padded. In the center cut out the cloth and fill in with lace stitches for the medallion. Fasten with one button. Attach ¾ yard white wash ribbon to the upper corners.

The ball and socket fasteners can be bought and adjusted at almost any glove store. Such a safety pocket as the large one can be used to carry securely a variety of things, although meant especially for jewelry. Take this pocket on a journey and you will find new uses for its pockets.



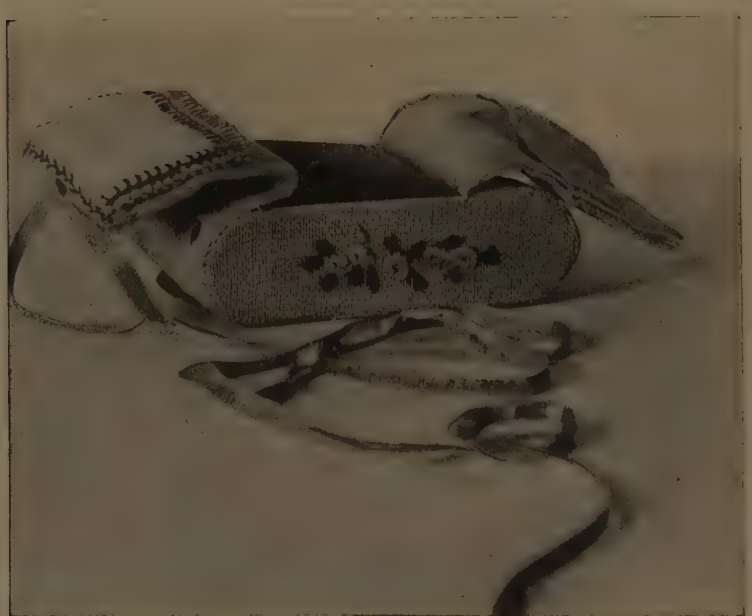
A CASE FOR JEWELRY. This may be made a very beautiful gift. Materials: Two pieces of cardboard 4″ × 1⅛″. Round the corners as in the diagram. One strip of gray linen, canvas weave, 12″ × 3″. One skein of old rose filo silk; three skeins of yellow-green silk, corresponding in value to the old rose, one lighter, one darker. The mercerized embroidery cottons are in some ways more desirable than the silks, being more in harmony with the material. Embroider upon one end a conventional rose-tree, with sprays scattered over the rest, or use any other design. Embroider the linen that



covers the cardboard in a similar way. Cover the cardboard and line with old rose silk. Line the long strip, making a pocket 1½″ deep at one end. Buttonhole-stitch the edges of flannel (see diagram) with shades of green, and sew on the other end to be used for collar pins. Fasten the middle of the strip to the middle of the stiffened sides. Sew on over and over, leaving an opening of two inches on the opposite side.

Attach one yard of ribbon at its middle point to the middle of the strip, leaving the heavily embroidered end uppermost. When completed, this Jewelry Case has a most attractive appearance, its shape suggesting mystery as to contents. If done with the materials named, and in the design suggested, its outer surface will strongly suggest the beaded bags of the nineteenth century. What wonders of needlework were those, often embroidered all over in one solid surface of beading!

It would be well if we could again find time to make such things, by the same leisurely methods that our mothers used. For, admitting that we would lose valuable time, we should doubtless live longer.



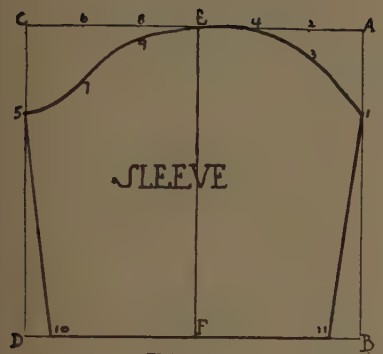


FIG. 2

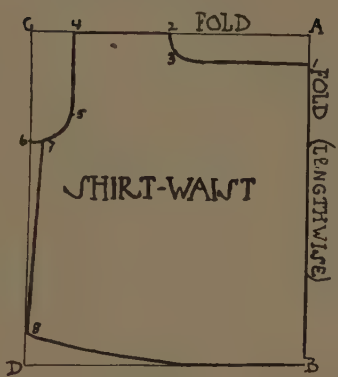


FIG 1

PLATE I

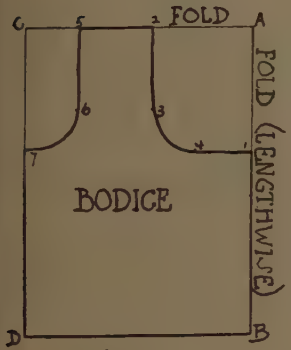


FIG 3

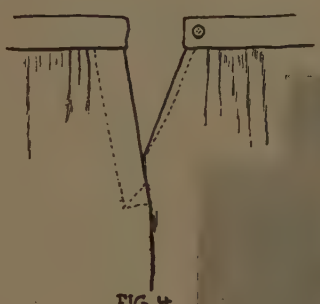
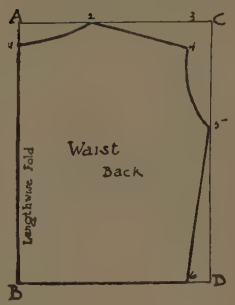


FIG 4

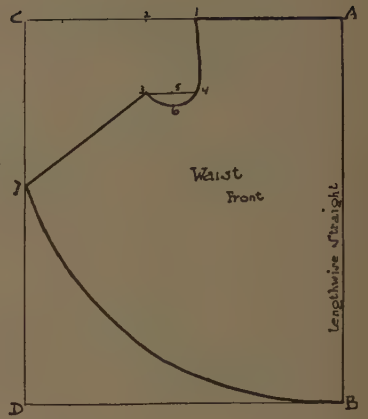
COSTUMES FOR FOLK DANCES or for a doll. Point 1 is ½″ from A. Point 2, 2½″ from A. Point 3, ½″ from 2. Draw curve from 1 through 3 to 2. Point 4 is 1¾″ from 2. Point 5 is 1½″ from 4. Point 6 is 2″ from C. Draw curve from 4, through 5 to 6. Point 7 is ¼″ from 6. Point 8 is 3½″ from 6. Draw curve from 8 to B. Open pattern and cut one fold from 1 to B, for opening at back. Cut material folded same as pattern. Hem back edges. Gather neck from point 3 on each side to center back and front, and bind. French-seam under arm. Hem bottom. Locate waist line in back, and tack center of tape, to tie about waist, to center back. For a pattern for twelve-year-old girl, take paper 30″ × 36″, multiplying all numbers by 3. For Sleeve Pattern: Use paper 6″ × 5½″. Place with short edges vertical and letter corners as in chart. Calculate measurements by spacing from Fig. 1. For Bodice, paper must be 8″ × 12″. For Apron, 9″ × 11″, and for apron for child, one width of 36″ cloth. For Skirt, cut goods 11″ lengthwise and 27″ wide. Hem 1″ at bottom. Placket opening at center back, 3″. Hem placket narrow one side, sloped to point, ½″ hem on other, tacking wide over narrow at bottom. Gather each side from front center, two rows, to hems. Place in band cut lengthwise, 1½″ wide. For child, use about 3½ breadths of material 31″ wide. Cut long enough to reach nearly to ankles, allowing hem.

ENGLISH PEASANT COSTUME for doll or child. Fig. 1, Front of Waist: Paper, 8″ × 6″. A–B is front edge of surplice front. Points: 1 is 3″ from A; 2, 4¼″ from A; 3, 1½″ from 2; 4, 1″ from 3; 5, ½ distance 3 to 4; 6, ¼″ from 5; 7, 3½″ from C. Line A–1, shoulder. Line 3–7, under arm. Curve 1–4–3 front of armhole. In cutting, fold selvages together, place line A–B even with selvage, allowing for hem. Shirr shoulder to fit shoulder of back. Back of Waist, Fig. 2: paper, 3″ long, 4″ wide. Fold on center, making oblong 3″ long and 2″ wide. Points: 1 is ½″ from A; 2, 1½″ from A; 3, 3½″ from A; 4, 1½″ from 3; 5, 2¼″ from C; 6, ½″ from



PATTERNS FOR 19" DOLL
SCALE ¼"=1"

FIG 1



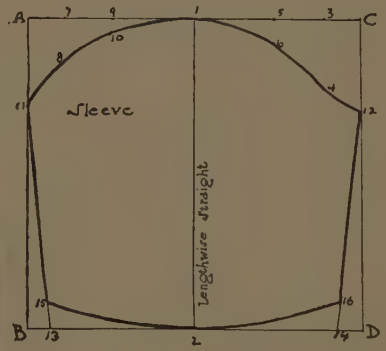


FIG 4

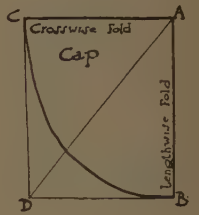
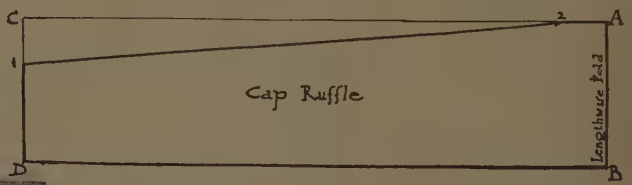


FIG 5

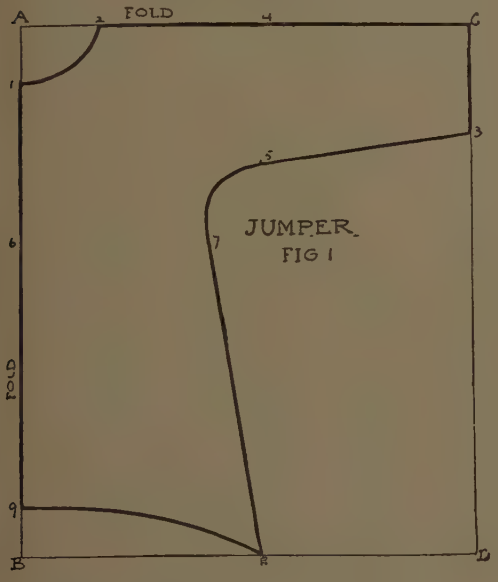


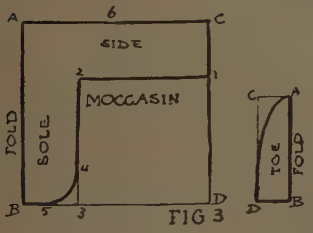
D. Line 1–B center of back; 2–4, shoulder; 5–6, under-arm; 1–2, neck; 4–5, back of armhole. To cut, place center of back on lengthwise fold of cloth. Face back of neck with bias strip of cloth. From the dimensions of these two figures, your judgment will enable you to space off for the Sleeve, Cap, and Cap-ruffle patterns. Sleeve is gathered into deep cuff and shirred halfway down. Its pattern is 6½″ × 7″. That of the Cap, 7″ × 6″. Of the Cap-ruffle, 12″ × 1½″. Cap crown is gathered to a narrow tape. Line 1–2–A of Ruffle is shirred to fit head. Hem ½″ on edge B–D. Trim with ribbon and bow. A three-cornered kerchief of soft white material may be worn inside the neck, the surpliced fronts crossing over the kerchief.

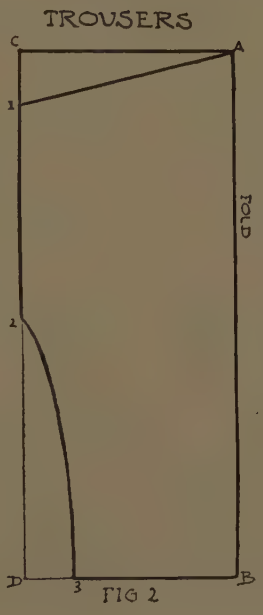
AN INDIAN DRESS FOR A DOLL. For Jumper: Take paper 17″ × 20″, folding lengthwise and crosswise, and marking lengthwise fold A, B, and edges C, D. Points on diagram are: 1, distant 1″ from A; 2, 1½″ from A; 3, 2″ from C; 4, 4½″ from A; 5, 2½″ from 4; 6, 4″ from A; 7, 3½″ from 6; 8, 4½″ from B; 9, 1″ from B. Curve for neck from 1 to 2. Curve for bottom from 8 to 9. Fringe sleeve from C to 3. Fringe bottom from 9 to 8. The garment may be made longer if necessary.

For Trousers: Paper, 8″ × 10″. Fold lengthwise, mark fold A, B, edges, C, D. Point C is center of back. Point 1 is 1″ from C. Point 1 is center of front. Point 2 is 5″ from C. Point 3 is 1″ from D. Curve from 2 to 3 for inside of leg. Fringe bottom of trousers.

For Moccasins: Paper 7″ × 3½″. Fold into square, mark fold A, B, edges C, D. Point 1 is 1″ from C; 2 is 1″ from line A, C and A, B; 3 is 1″ from B; 4, ½″ from 3; 5, ½″ from 3. Curve from 4 to 5 for heel. Point 6 is 1½″ from A. Gather from A to 6. For the Toe: Paper, 2″ × 1″. Fold lengthwise and mark as before. Curve from A to D for toe. In making, place A of sole to A of toe, and gather fullness around point of toe. Edges C–1 are seamed together and placed at B of sole, and sewed around sole. Toe portion may be opened from B towards A, and tied. For child's size increase by three except for moccasins.







BEH.

GERMAN PEASANT GIRL'S COSTUME. Waist: Use for front pattern paper, $7\frac{1}{2}'' \times 6\frac{1}{2}''$. Points of diagram: 1 is from A, $2\frac{3}{4}''$; 2 from A, $1\frac{1}{2}''$; 3 from A, $4\frac{1}{2}''$; 4 from 3, $1\frac{1}{2}''$; 5 is $\frac{1}{2}$ of line 4–2; 6 from 5 is $\frac{1}{4}''$. Armhole curve is 1–2–6–4. Point 7 is from C, $4\frac{1}{2}''$. Draw line 4–7, curve inside for under-arm seam. For Back: paper, $6\frac{3}{4}'' \times 3\frac{1}{4}''$. Points: 1 is from A, 1″; 2 from A, $1\frac{1}{4}''$. Draw back of neck 1–2. Point 3 is from C, 1″. Draw shoulder line 2–3, cutting off at 4, which is from 2, 2″. Draw curve 4–5 armhole. Point 6 is from D, $\frac{1}{4}''$. Draw curve 5–6, under-arm seam. Sleeve: paper, $7\frac{1}{2}'' \times 7''$. Draw diameters E–F and G–H. E, highest point of upper sleeve, F, lowest part of curve at hand. Points: 1 from A is $1\frac{3}{4}''$; 2 from C, $1\frac{3}{4}''$; 3 from A, $\frac{1}{2}''$; 4 from 3, $1\frac{1}{2}''$; 5 from A, 1″; 6 from 5, 1″; 7 from C, $\frac{1}{2}''$; 8 from 7, $1\frac{1}{4}''$; 9 from C, 1″; 10 from 9, $\frac{3}{4}''$. Draw curve top of sleeve. Point 11 from D is $\frac{3}{4}''$; 12 from B, $\frac{3}{4}''$. Draw curve bottom of sleeve. Point 13 from G is $\frac{1}{2}''$; 14 from H, $\frac{1}{2}''$. Draw inside seam of sleeve. Bodice: paper, $6'' \times 5\frac{3}{4}''$. Points: 1 from A is $3\frac{1}{4}''$; 2 from A, $2\frac{1}{2}''$. Draw curve neck front. Point 3 from C is $1\frac{1}{4}''$; 4 from C, 2″. Draw curve back of neck. Point 5 is from A, $3\frac{1}{4}''$; 6 from 5, $\frac{1}{2}''$; 7 from 5, $3\frac{3}{4}''$; 8 from 7, $1\frac{1}{2}''$; 9 from 8, 1″; 10 from 8, 1″. Materials: cheesecloth, plaid gingham, black silk, and strips of scrim, embroidered. Bodice laces with red cord. The apron is embroidered with bands worked in red on white scrim.

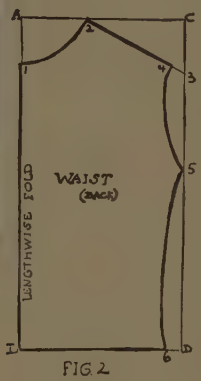


FIG 2

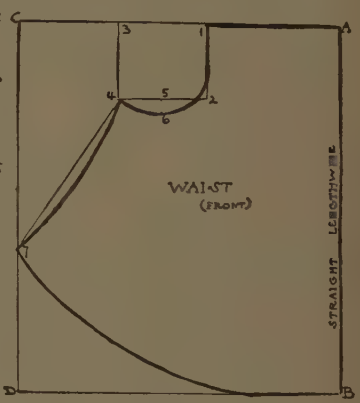


FIG 1

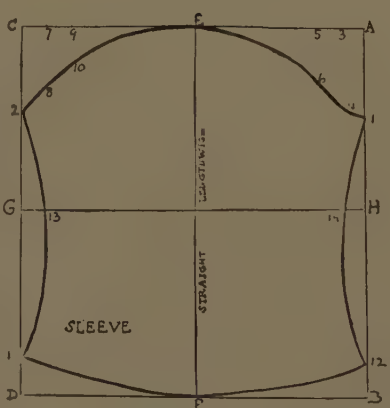


FIG 3

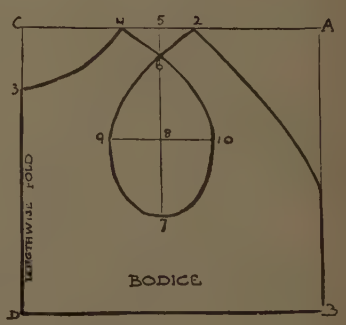


FIG 4

PATTERNS FOR 19″ DOLL
SCALE $\frac{1}{4}'' = 1''$

A DRESS FOR A COLONIAL DAME; and no daintier costume is conceivable for a little American girl, or her dolly, for that matter. Making this dress will teach a little lesson in patriotic history. It was worn by our grandmothers when they were the belles of the eighteenth century and looked eagerly forward, as we do, to the coming party or reception. The stately dance offered just the chance to wear such a gown becomingly, with its prim waist and full skirt, never meant to whirl out from the dancer, but to rise and droop gracefully as she curtsied in the minuet.

"How she held her pretty head,
How her dainty skirts she spread,
Turning out her little toes,
How she slowly leaned and rose,
Long ago."

There was not then the daring audacity which impelled one damsel or another to depart from established custom in dress; most of the gowns for an ordinary party were patterned more or less alike in our eighteenth century colonial period, but this was offset by great variety in material and color. The graceful plait at the back of the neck, sweeping sheer down to unite with the train, and named for the painter Watteau, was a feature usually present. And if the occasion happened to be one of unusual festivity, she might wear the full gown of the sweet shepherdesses that he so loved to paint, with a full pannier overskirt effect as well as the plait. At the first inauguration ball, when the adored Washington had been made the first president of our land, records tell us that his costume was "a full suit of black velvet, with long black silk stockings, white vest, silver knee and shoe buckles, the hair being powdered and gathered together at the back in a black silk bag, tied with a bow of black ribbon. He wore a light dress sword, with a richly ornamented hilt, and often carried in his hand a cocked hat decorated with the American cockade." And it is added that "the collection of ladies at this ball was numerous and brilliant, and they were dressed with consummate taste and elegance."

The costume: Waist front paper pattern, $5\frac{3}{4}'' \times 5''$. A–B and C–D long way of paper. Points: 1 is from A, $1\frac{1}{4}''$; 2 from 1, $2''$. Draw front, E to B. Point 3 is from C, $1\frac{1}{4}''$; 4 from 3, $2\frac{3}{4}''$; 5 from 3, $\frac{1}{2}''$. Shoulder from E to 5. Point 6 is from C, $2''$; 7 from 6, $\frac{3}{4}''$; 8 from 7, $\frac{5}{8}''$; 9 from 7, $\frac{1}{2}''$. Armscye, 5–9–4–8. Point 10 is from D, $\frac{3}{8}''$. Curve under arm, 8–10. Back: paper, $4\frac{3}{4}'' \times 2\frac{1}{2}''$. Points: 1 is from A, $\frac{3}{8}''$; 2 from A, $\frac{3}{4}''$. Draw neck curve. 3 is from C, $\frac{3}{4}''$. Draw shoulder 2–3. Four is from

C, $2\frac{1}{4}''$; 5 is from 4, $\frac{1}{4}''$. Draw back armscye. Six is from D, $\frac{3}{4}''$. Curve 5–6 is under-arm seam. Vest: paper, $3\frac{1}{2}'' \times 1\frac{1}{4}''$. Point 1 is $1\frac{1}{2}''$ from B. Sleeve: paper, $5'' \times 5\frac{1}{4}''$. Points: 1 is from A, $1\frac{3}{4}''$; 2 from C, $1\frac{3}{4}''$; 3 from A, $\frac{1}{2}''$; 4 from 3, $1\frac{1}{2}''$; 5 from A, $1''$; 6 from 5, $1''$; 7 from A, $1\frac{1}{2}''$; 8 from 7, $\frac{1}{2}''$; 9 from C, $\frac{1}{2}''$; 10 from 9, $\frac{3}{4}''$; 11 from C, $1''$; 12 from 11, $\frac{3}{8}''$. Draw top sleeve curve 2–10–12–E–8–6–4–1. Point 13 from B is $\frac{1}{2}''$; 14 from D, $\frac{1}{2}''$; 15 from 13, $\frac{1}{4}''$; 16 from 14, $\frac{1}{4}''$. Draw bottom curve of sleeve 16–F–15. Be careful to make a good curve.

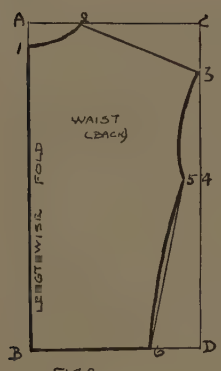


FIG 2

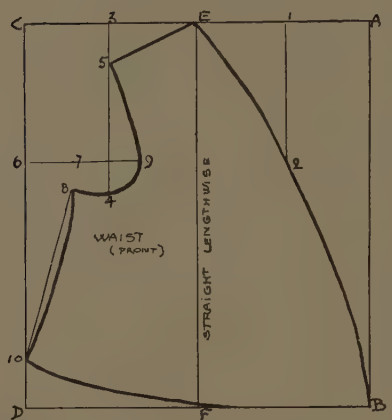


FIG 1

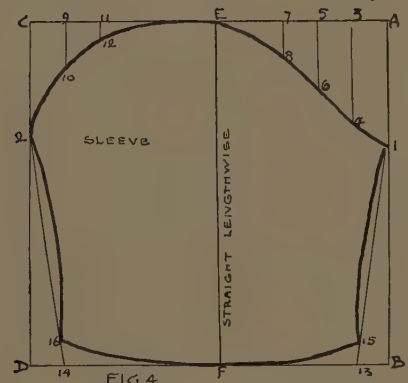


FIG 4

PATTERNS FOR 19 INCH DOLL
SCALE $\frac{1}{2}$" = 1"

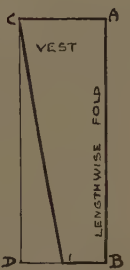


FIG 3

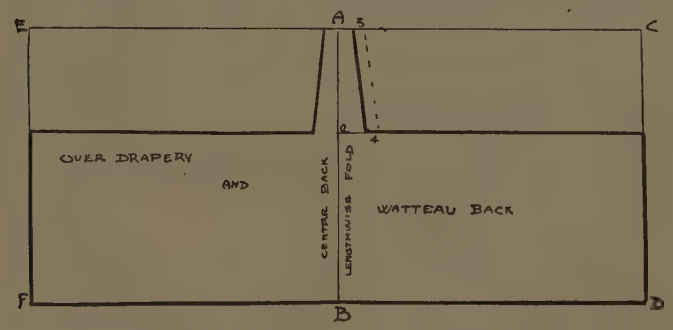


FIG. 5

Curve slightly, 2–16 and 1–15, but be careful and not curve too much. Over-drapery and Watteau back. One-half pattern only necessary. Paper 18″ × 16″. Points: 1 is from C, 6″; 2 from A, 6″; 3 from A, $\frac{1}{16}$″; 4 from 2, $\frac{1}{8}$″. 3–4, edge of Watteau plait. Dotted line, under portion of plait. To make: Seam waist together at shoulder and under arms. Face lace over fronts of waist and around neck. Gather the top of the sleeve, next baste the seam, try it on to see how closely you have calculated, fit it close to the lower part of arm, then French-seam, put ruffle of lace at lower edge, insert sleeve in waist. Vest pattern shows lining portion, to gather lace over, with double lace ruffle as heading at top. In gathering, allow 1½ times amount of lace. Fasten to lining front. Make Watteau plait, fasten to center back of neck under lace collar. Turn under edges of top of shirt, portion 1–4, gather close to edge, and fasten to waist at waist line. Hem fronts, 1–D, and bottom, D–B. Adjust waist and drapery over quilted petticoat which is made straight and full, and tack drapery to petticoat, high on hips at each side of front and back. Petticoat requires one breadth of material for doll's costume, and to the ankles in length. If possible, the typical materials should be used; for the petticoat, quilted satin. For the waist and overdress, the material shown here was blue and white figured silk. The hair should be dressed high in powdered puffs, and black patches (court plaster) should be worn on the face. These were often placed at the corner of an eye, on the forehead, chin or cheek. They were cut in the shape of stars, circles, crescents, arrows, and among the very stylish, on state occasions, a whole stagecoach has offered the motif. Of course they were small and dainty, and for the doll should be very small. A fan, rather small in size, is quite a necessary adjunct for a costume for the minuet. Such a fan can be made out of pasteboard and paper, or silk. See a colonial fan if you can. In designing for a child of twelve years old, multiply all these dimensions by three.

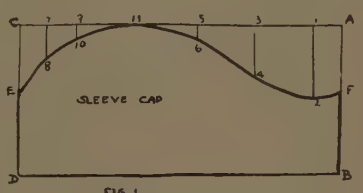
. A SWEDISH COSTUME. This offers a problem somewhat new, in that the skirt and bodice are fastened together, so that the weight comes from the shoulders. The skirt is straight and full, but sloped up in front ½″ to meet the high bodice. This allows full skirt portion of the dress to appear above the apron band. Skirt should reach nearly to the ankles. The bodice is laced with cord, allowing the points to draw apart toward the top. A white guimpe is worn under this bodice, and for the front and back you can utilize the waist pattern of the English Peasant Costume. On the front, measure down 4″ from A on line A–B, and 1″ from point 3 on under-arm seam. Connect these points and cut. On back, measure 1″ from 5 on under-arm and 2″ from A on A–B. Connect these points and cut. Cap of Sleeve: paper, 5½″ × 2½″. Points: 1 is from A, ½″; 2 from 1, 1⅛″; 3 from A, 1½″; 4 from 3, 1″; 5 from A, 2½″; 6 from 5, ¼″; 7 from C, ½″; 8 from 7, ½″; 9 from C, 1″; 10 from 9, ½″; 11 from A, 3½″; E and F are from C and A each 1″ respectively. Draw top curve of sleeve through 8–10–11–6–4–2. Lower part of sleeve, Fig. 2: paper, 5¼″ × 7″, halved by line E–F. Fold on this line and cut double. Points: 1 from B is ¾″; 2 from D, ¾″, making curve for lower edge of sleeve. Point 3 is from A, 2″; 4 is from C, 2″; 5 and 6, each ¼″ from 3, and 4, for inside seam of sleeve. Bodice: paper, 5¼″ × 3½″. Points: 1 is from A, 2″; 2 is from 1, ½″; 3, 1⅛″ from A; 4, 2¼″ from 3; 5 from 3 is 1″; 6 from A, 2¾″; 7 from C, 2″; 8 from 7, 1″; 9 from C, 2″; 10 from 6, 2¾″; 11 from 6, ¼″; 12 from 6, ½″; 13 from 6, 1¾″; 14 from 13, ¾″; 15 from 13, ¾″; 16 from B, ½″. Armscye curve is through 11–15–10–14–12. Collar: paper, 4½″ × 2½″. Points: 1 is from A, 1″; 2 from A, 1½″; 3 from C, 1½″; 4 from C, 1″; 5 from 4, 1⅛″; 6 from B, 1″; 7 from 6, ¾″. Draw inside neck 3–5–2. Draw outside collar D–7–1. Crown of Cap: paper, 4″ × 3″. Point 1 is from C, ½″; 2 is from 1, ½″; 3 from B, ¼″. Band of Cap: paper, 2¼″ × 1¾″. Point 1 is from C, ⅜″; 2 is from B, ⅜″. Side of Cap: paper, 3½″ × 4″. Points: 1 is from A, ½″; 2 from C, ⅞″; 3 from C, 1⅛″; 4 from D, ⅜″; 5 from C, 2″; 6 from D, 2⅛″. 3–4 and 5–6 are edges of plaits. Cut four sections for band of cap and two sections for the collar and crown of cap. Other portions to be cut double only. Seam two

sections of collar together, except on inside curve of neck, then turn and crease. Seam upper part of collar to waist from wrong side, and hem under part into position over seam. Gather straight upper edge of sleeve into lower edge of sleeve cap before seaming inside seam of sleeve. Trim collar and sleeve with bands to match bodice. Hem bottom of guimpe for a draw string. Neck and armscye of bodice are to be faced with bands of same, cut in a true bias. Gather skirt and sew to bodice with placket in front, under apron. The making of the cap must be carefully done; having cut four portions of band, seam each pair around lower edge and plait crown portion of cap into upper edge of band, allowing plaits to extend to top of crown, then seam top edges of crown portions. Set lower edge of crown to upper edge of band, then insert plaited side portions at each side, having the plaits turn towards the back. Seam at each edge, face inside portion

of band and quilt band vertically. The costume as shown in the picture is made of a mercerized muslin, the skirt of a magenta color, and the bodice of yellow. The apron is green, with yellow bands, and cap and guimpe are of white lawn. For a child of ten to twelve years the dimensions must be enlarged three times.

The most brilliant colors of any civilized class of peasantry are those seen in the different parts of the Scandinavian peninsula. The deep valleys of this land have acted as physical barriers between families and villages, until the habits of centuries have become fixed with each, and one result has been the costumes of different pattern and color which now mark certain localities. And what a land of legend, of towering mountain and waving waterfall! The thoughts of ages were woven by a poetic folk into strange and interesting folk tales at an early time. These *sagas*, as they are called in the older Norse tongue, were doubtless well formulated in verse while Britons were yet in the stage of picture writing, and centuries before America was first seen by the earliest sea rovers from the wild Norse coast.

These home songs and stories, poems and records, took note of all phases of life, breathing a water sprite into every cascade and stream, giving to the sea-waves the forms of invisible maidens, and lending a meaning full of poetry to the homeliest acts and habits. In the springtime sang the Stromkarl, the spirit of the streams, and girls clad in just such costumes as this one learned with their first conscious memories to sing the old spring song, "Varvindar Friska," in which a wild but joyous picture is rendered of the spring coming in the northland, when the waterfalls are roaring full, the winds chasing the loosened dead leaves and the cry and song of the spirits of wood and water are everywhere heard. And in just such a costume is supposed to invade the dance that odd creature, the Hulda, a spirit-girl from the mountain fields, but with a tail like a cow! She enters at the door when the dance is at its height, says the legend, and is welcomed as a pretty stranger; the sturdiest youth seek her hand in the merry figures, and she, nothing loth, gives cordial consent. When lo, suddenly someone discovers the tail; there is a scream, the dance wavers, and the Hulda vanishes! Such is one legend of the winter fireside.



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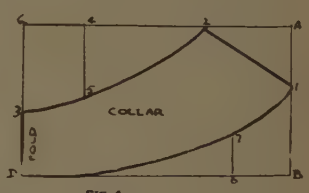

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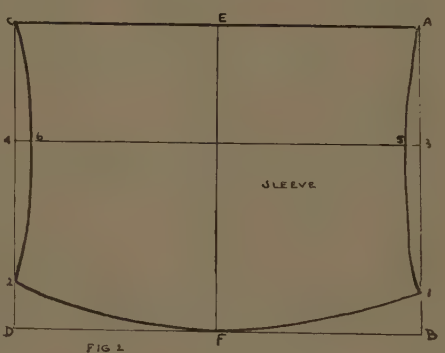

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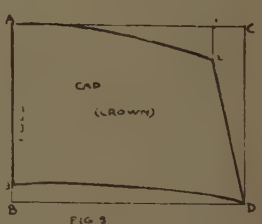

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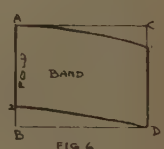


FIG 6

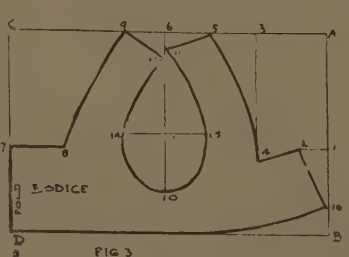


FIG 3

PATTERNS FOR 19" DOLL
SCALE ½" = 1"

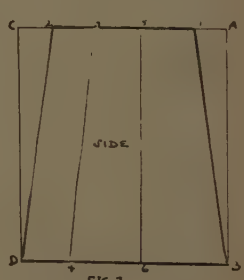


FIG 7

SCOTTISH HIGHLAND COSTUME. Jacket: paper, 8″ × 9″. Points: 1 is from A, ½″; 2 from A, 1″. 1–2 is back of neck. 3 is from A, 2″. 2–3 is front of neck. Four is from C, 2″; 5 straight in from 4, 5″. Draw 5–D. Place 6 on this line ½″ from 5. 7 is from B, 2½″; 8 from B, 5″; 9 from 8, 1″. 4–6–9 is sleeve seam and under-arm seam; 7–9 is rounded bottom of jacket. For Cuff: paper is 4¾″ × 2½″. Points: 1 is one-half of line A–B; 2 is from A, ½″; 3 is from B, ¼″; 4 is one-half of C–D. Curve as shown. The Sporran, a leather purse-pocket to hang from belt. Paper: 4½″ × 1¾″. Points: 1 is from A, 2¾″; 2 from C, 2¾″; 3 from A, ¾″; 4 from C, ¾″; 5, one-half from A to 3; 6, one-half from C to 4. Fold on 3–4 and 1–2. Cap: paper, 8″ square. Fold in quarters. For point 1, measure distance A–B from B on line C–D, and draw circle freehand. Draw another inside this, radius 2½″ through 2–3–4. To cut and make. The Jacket: open pattern at fold and place on double thickness of cloth, with lines A–B at selvage edges. Seam back of jacket, curving slightly in at waistline, and leaving center back seam open 1½″ at bottom. Join sleeve and under-arm seams, leaving latter open 1½″ at bottom of jacket. This allows for the wide scallop effect always seen on the dress jacket of a Highland gentleman of the old days. Face all edges with narrow facing cut on true bias. Neck may be finished with band cut lengthwise straight of material, and a stand-up collar worn inside. Fronts of jacket to laps with buttons. Cuffs: cut with long, straight edge lengthwise of material. Face curved edges with bias piece of material. Seam cuffs on to sleeves, from the wrong side, turning on to right side, and finish points with buttons. The Sporran, Fig. 3, in doll's size, may be fashioned from an old kid glove if no other leather or skin is at hand. The pocket is made by folding up on line 1–2 and stitching edges and the flap by folding 3–4 over the open top of this pocket. A fringe may be stitched on to the bottom. The straps by which the sporran is hung to the waist-belt should be very small, and have loops at the top, flattened, for the belt to slip through.

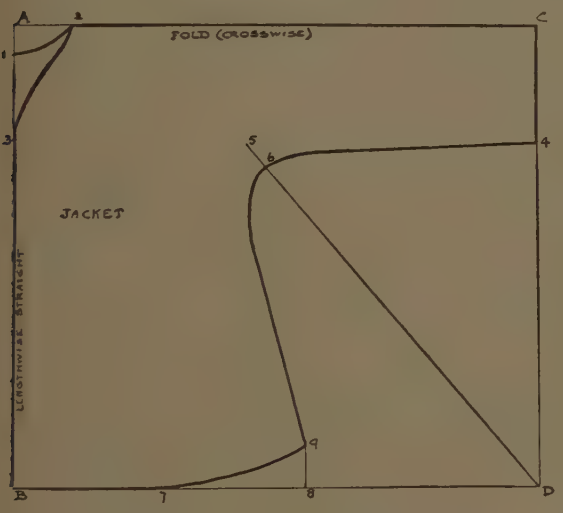


FIG 1

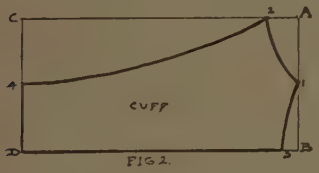


FIG 2.

FIG 3

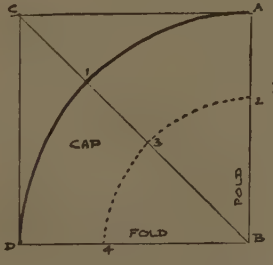


FIG 4

PATTERNS FOR 19" DOLL
SCALE 1" = 1"

The cap is cut from cloth with lines A–B or B–D, lengthwise. Turn over on inner circle and lay fullness in plaits, sloping these directly towards center. Sew into a straight band just the head size. Finish cap, at left side, with quill and rosette. The plaided portion of the suit is in this case modeled after the more ancient garment, where the kilt or philabeg, and the shoulder blanket, now known as the plaid, were all in one piece. The wearer wrapped this long strip around his body at

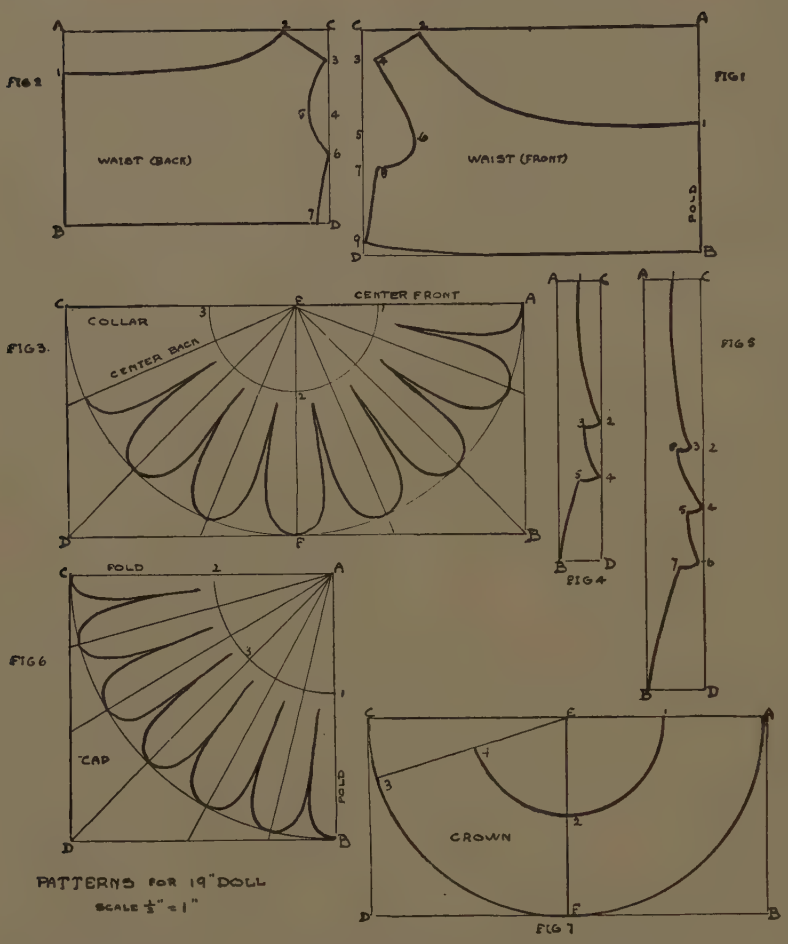
the waist after carefully plaiting it into folds to suit his own fancy, and then buckled his belt around him to hold it in position. The long free end was then carried up the back and over the left shoulder, where it was fastened by the brooch, on the front side. Sometimes, if it was extra long, it was wound about the body before fastening, over the left shoulder and under the right armpit. This ancient garment is made in the doll's size by taking a strip of plaid 54″ long and 8″ wide, and laying plaits according to the pattern of the plaid, the number depending on the waist size. Beginning at right side, place around body of doll. Where it meets around the body, fasten with a stitch or use a doll's belt. Then carry the remaining free end, plaited the opposite way of the material, up the back and over the left shoulder to the front, passing it through a buckle or fastening with a breast-pin. Some of the actual shoulder brooches worn were very large, often as much as four inches across, and richly jeweled. Allow the free end to hang down in front. The tartan will cross at the opening of the seam in right side of jacket, if rightly placed. Hang another belt over right shoulder, and under left armpit for the sword-sheath. The costume shown here is made from red plaid goods, with a jacket of a quiet, harmonizing tone. The stockings are cut from the plaid cloth, on a true bias. The cap is made from blue cloth and the rosette from blue binding ribbons to match. For a child of ten to twelve years, multiply these dimensions by three. This costume is one of the most striking and warlike among the peoples reckoned as civilized. Indeed, in the days of their earlier existence the people of the Highlands could hardly be said to come under the class of any considerable degree of civilization. The tribal conditions prevailed, and the chief of the clan was supreme ruler and law unto the clan. There is about the costume a dash and swing that no other possesses.

"O, our sojer lads looked braw, looked braw —
Wi' their tartan, kilts, an' a', an' a';
Wi' their bonnet an' feather an' glitterin' gear,
An' the pibroch sounding loud an' clear!"

The kilt of to-day is reduced to a sort of skirt, kilted after a fashion known to the military tailors of England, and is held in place by a short strap and buckle, while the military plaid is merely a light-weight length of cloth, caught by the brooch. The skin of the sporran has the hair on, a silver top or crest, and three tassels of a hair darker than the sporran. In full dress the ancient dirk knife dangles at the right side of the sporran, and stuck in its sheath are the soldier's knife, fork and spoon. You will remember the amusing case of the redoubtable Rob Roy, told in the book of that name by the great Sir Walter Scott; of how the chief had made an elaborate lock to the pocket of his sporran, which would discharge a loaded pistol at a thief. It did not seem to occur to him that one might cut the skin and not disturb the lock. Perhaps some traveler friend can buy for you one of the exquisite little toy "stands" of pipes to match the suit.

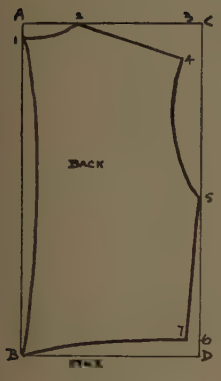
A DAISY COSTUME, SUITABLE FOR MAY-TIME. This costume represents one of the spring flowers, the daisy, which, with other flower-dresses, is suitable for a dolls' May party, or if made up in full wearing size, may deck some little maid most prettily for the Maypole dance and the other festivities of that happy time. For the doll size the paper pattern should be, for Waist Front, 6″ × 4″. Place and letter as in chart. The points are: 1 is from A, 1¾″; 2 is from A, 5″. Draw freehand curve for neck, making a full, deep curve, as it is for front of neck. Point 3 is from C, ½″; 4 is from 3, ¼″; 5 is from C, 2″; 6 is from 5, 1″; 7 is from C, 2½″; 8 is from 7, ¼″. Draw curve for armscye, 4–6–8. Point 9 is from D, ¼″. Draw under-arm seam 8–9. Back of Waist, Fig. 2. Paper: 4¾″ × 3½″. Point 1 is from A, ¾″; point 2 from A, 4″. Draw freehand curve for neck, more shallow than for front. Point 3 is from C, ½″; 4 is from C, 1½″; 5 is from 4, ⅜″; 6 is from C, 2¼″; 7 is from D, ¼″. The Collar, Fig. 3. Paper: 4″ × 8″. Divide in center by line E–F. With center at E and radius E–A, draw circle for construction. With same center draw another circle with radius E–1, which is 1½″. Divide circle as shown and draw petals freehand. The Leaf, Fig. 4. Paper: ¾″ × 5″. Point 1 is one-half of top line A–C. Point 2 is 2½″ from C; 3 is ¼″ from 2; 4 is 3½″ from C; 5 is ⅜″ from 4. The Large Leaf, Fig. 5. Paper: 7¼″ × 1″. Point 1 is one-half of top line A–C. Point 2 is from C, 3″; 3 is from 2, ¼″; 4 is from C, 4″; 5 is from 4, ¼″; 6 is from C, 5″; 7 is from 6, ½″; 8 is from 3, ¼″. The Cap, Fig. 6. Paper is 4¾″ square when folded four double. With A as center draw two circles, one radius A–B, the other radius of 2″, or A–1. Divide circle as in chart and draw petals freehand. The Crown, Fig. 7. Paper: 7″ × 3¼″. Divide by line E–F. With E as center draw circles with radius E–F, and E–1, which is 1¾″. In making this costume, cut all material with lines A–B or E–F of patterns lengthwise straight of goods, cutting A–B of front of waist on a lengthwise fold. Allow for hems on back of waist. Gather waist to fit neck of doll, and face neck with bias facing. Cut out neck of collar at inner circle. Place piping of yellow at inside of neck. Face armscye with bias facing. Cut four large and six small leaves for each armscye, sewing them on from the wrong side, two large leaves at under-arm seam, and two at shoulder, and three small leaves at each side of armscye, so that they will fall over the arm instead of sleeves. Gather bottom of waist into band of required size for waist, and also gather straight full skirt into same band, making skirt ankle length. Draw the cap pattern on pure white paper and paste pattern on to white lawn before cutting out petals. After cutting petals curl them over pencil. Cut head size at inner

circle. Paste crown of cap on to green material before cutting. Fasten edges 1″ and ¾″ of crown together, then fasten petal portion to crown. Cut six small leaves for crown and fasten to center opening so that they will fall over calyx portion. For a full-size costume,



early in the morning to gather flowers and hawthorn branches for garlands to decorate the doors and windows of all the houses. This was called "bringing home the May" and is referred to by Chaucer in his "Court of Love." "Forth goeth all the court, both most and least, to fetch the flowers fresh." It was also the custom to erect, in every village and town, a high pole, called the Maypole, and on the first day of May this pole was decorated, and the young men and maidens danced about it during the day and evening. A May Queen was chosen to whom all paid homage during the festivities, this no doubt being a custom handed down from the Romans, who performed rites to the goddess Flora, during their spring celebration. We still have this idea carried out in the queen selected for the floral fêtes held in the west and south, in our own country. Villages tried to outdo each other in the size and decorations of their Maypoles, and of a number erected in London, one had a most curious and interesting history. An old letter, descriptive of May Day, 1610, is as follows: "Last night I slepte but ill soe was awake in the dawne of day, and forth to coole my braine in the freshe dewinesse of the earlie morne. There was a tumult of sweete sounde from the throat of a thousand birdes till alle the ayre from far and neare, was fulle of theire jubilate and all the breath of the morne was laden with the bitter fragrance of Maye. (The hawthorn.) They have decked the village alle out, lintel and beame." During Cromwell's time Parliament ordered all Maypoles removed and enforced this ruling by severe penalties.

of ten to twelve years, multiply these dimensions by three. Barring Christmas, there is probably no time of the year which has been so much written about as May, the gem of the springtime. The first of the month commemorates the breaking forth into beauty of all nature, after the stern hand of winter has held all in its grasp for months. The Romans celebrated this season with their Floral Games, the festivities beginning on April 28 and lasting for several days, and from this time the celebration of the season has continued, though at some periods of history a greater or less decadence has set in. To see the observance of May Day at its fullest, we have to study the village customs of old England in the 16th century. The day was celebrated with all manner of sports, music and dancing, and it was customary for the middle classes to go forth



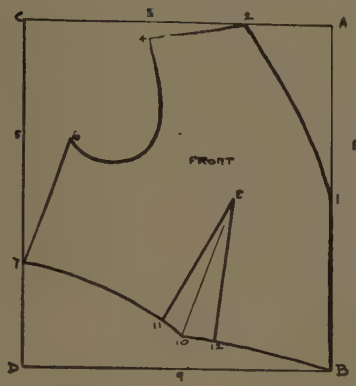
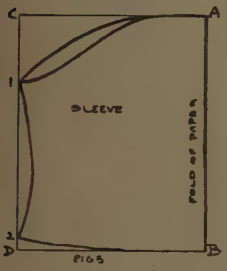


FIG. 1.

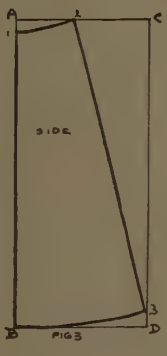


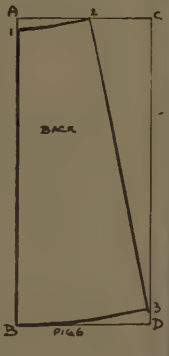
PATTERNS FOR 19" DOLL

SCALE FOR WAIST $\frac{1}{2}" = 1"$

SKIRT FOUNDATION

SCALE $\frac{1}{4}" = 1"$

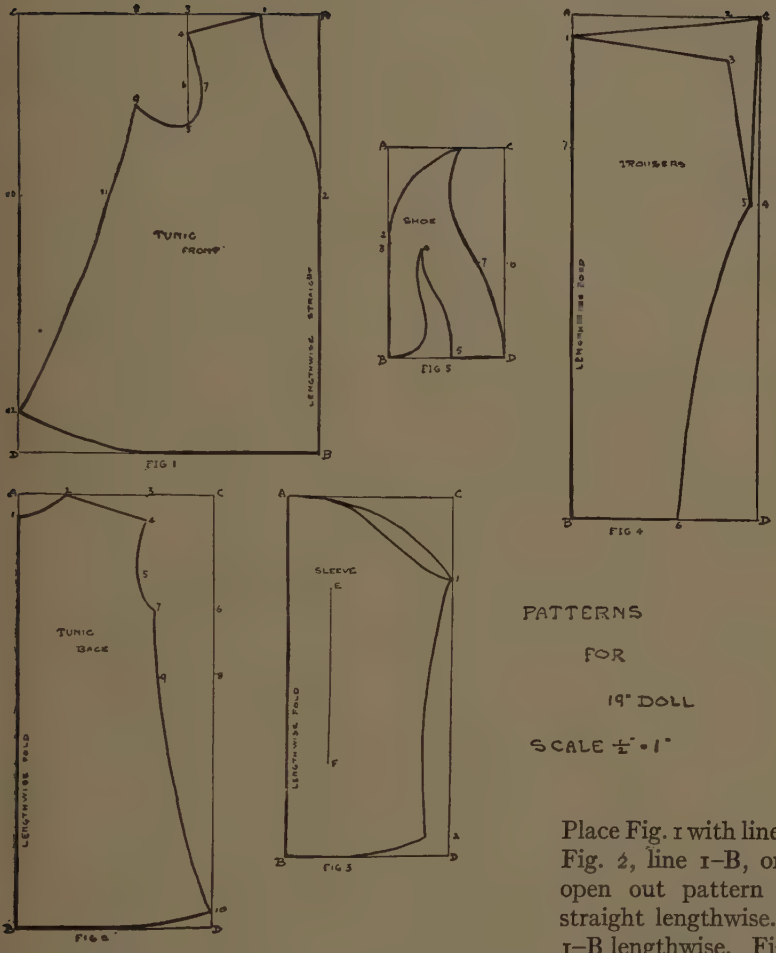




SPANISH COSTUME. Front of Waist. Paper: 6″ × 5¼″. Points: 1 is from A, 3″; 2 from A, 1½″; 3 from A, 3⅛″; 4 from 3, ¼″; 5 from C, 2″; 6 from 5, ¾″; 7 from C, 4¼″; 8 from 1, 1¾″; 9 from D, 2¾″; 10 from 9, ½″; 11 and 12 each ¼″ from 10. 1–2 is neck front; 2–4, shoulder line; 4–6, deep curve for front movement of arm in armscye; 6–7, under arm. Back of Waist. Paper: 5¾″ × 3″. Points: 1 is from A, ¼″; 2 from A, 1″; 3 from A, 2¾″; 4 from 3, ¾″; 5 from C, 3″; 6 from D, ¼″; 7 from 6, ¼″. Puff Sleeve. Paper: 8″ × 3¼″. Point 1 is from C, 1¼″; 2 from D, ¼″. The sleeve is gathered top and bottom, and trimmed with bands of contrasting color. Seam lines 8–11 and 8–12 of waist front together. Curve in back center of waist to fit. Join 1–B of side gore of skirt to 2–3 of front gore, and 1–B of back gore to 2–3 of side gore. Leave placket. Outside skirt to consist of 3 straight flounces overlapping, allowing once and a half for fullness. Mantilla is made of lace or thin silk, three cornered in shape, adjusted over a comb at the back, with the point of lace at the forehead. Part hair in middle and place a bright flower over each ear. This costume was made of white dotted muslin trimmed with black velvet ribbon. Cut all parts of patterns with lines A–B straight lengthwise of material, opening sleeve and placing fold A–B straight lengthwise. Place A–B of back of waist and A–B of front gore of skirt on lengthwise folds.

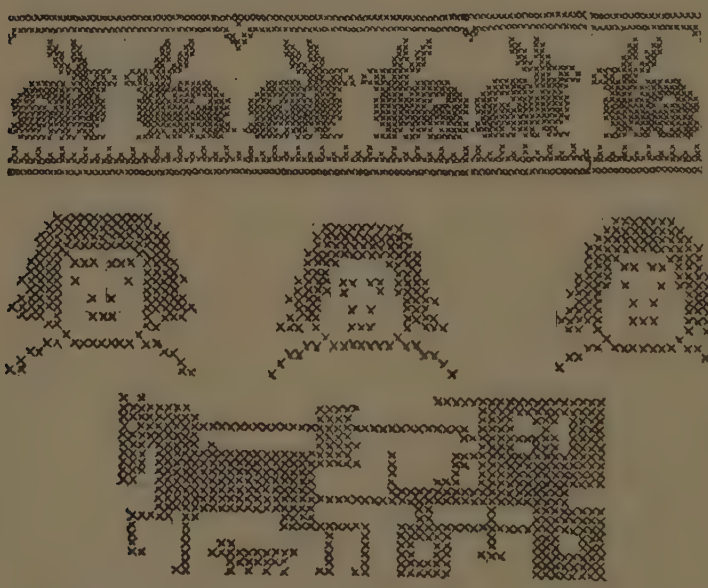
COSTUME OF A BARD OF ANCIENT IRELAND. One of the most interesting doll costumes of this series. It deals with a people older than those of the Scottish Highlands, and in fact the parent stock which gave them being, a people whose civilization — perfected to a degree, and undoubtedly polished in its life of castle and court — antedates that of the Highlands by centuries. The efforts of Irish scholars and historians to follow the ancient lineage back to the coasts of the Continent, and through the Mediterranean to the birthplace of our race, are well worth following by the student. They lead back to the tenth chapter of Genesis and are concerned with Gomer, Javan and Dodanim, of the line of Japheth. Music was early brought to a degree of great perfection with the Irish, and the harp, doubtless handed across the ocean from the days of the Shepherd King David, seems to have been their chief mode of expression in melody. The Bards, however, were not the musicians of their day; they were rather the poets, whose songs were usually sung by the minstrels who accompanied them. Nor were they like the musical rabble which overran the Continent in the later Middle Ages, whose members, mere wandering players, had in a sense to beg their living. These Irish Bards were men of high degree, and were educated, under the tutelage of the monks, in the history and craft of their native land. They became a sort of guild, which at one period grew to such numbers that their maintenance became a public burden. From the time of the conquest of Ireland by Henry II the profession began to decline, though long cherished by the lovers of music, and still a precious memory in the minds of every true Irishman. The harp, according to the beautiful folk tale that Thomas Moore has preserved in verse, was once a sea-maiden, whose grief for the lover who came no more wore her away to death, a story which is brought to mind by the form of the post of the harp as it to-day appears on the flag of Ireland.

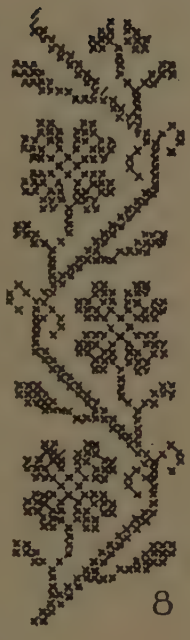
In the Gaelic speech the larger harp was called Clairseach, and figured at state banquets and royal occasions. It had from twenty-nine to fifty-eight strings, showing that the harmonization of ten centuries or more ago could have been of no mean order. The harp is referred to in the literature of the ninth century and appears in sculpture of the tenth century. A bit of Irish tradition thus brings in the harp: "A small but singularly sweet and very beautiful Harp, which had belonged to Donnechadh Cairbreach O'Brien, whose father was one of the last of the Irish kings, had by some means been removed to Scotland, and MacConnedke, the poet to this Irish chief, was directed by his master to endeavor to recover it, either as a free gift, or in exchange for a flock of fine Irish sheep. The envoy failed to induce the Scottish chief to restore O'Brien's harp, and on his return wrote a beautiful poem which details the effort and failure to regain the instrument. It is written in the peculiar spirit of the ancient Irish verse and one cannot read it without feeling the reality of the story. Once a year the Bards met in convention at

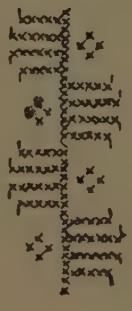


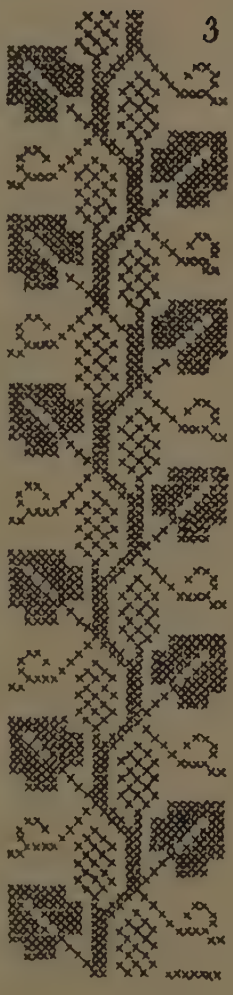
Tara, the ancient seat of Irish government, where contests of their skill were held, and which were attended by the great of the land." Directions for the Costume. Paper for the Tunic: $9\frac{1}{2}'' \times 6\frac{1}{2}''$. Points: 1 is from A, $1\frac{1}{4}''$; 2 is from A, $4''$; 1–2, neck curve. 3 is from A, $1\frac{3}{4}''$; 4 from 3, $\frac{1}{2}''$; 5 from 3, $2\frac{1}{2}''$; 6 from 3, $1\frac{1}{2}''$; 7 from 6, $\frac{1}{2}''$; 8 from A, $4''$; 9 from 8, $2''$. 4–7–5–9, armscye. Point 10 is from C, $4''$; 11 from 10, $2''$; 12 from D, $1''$. Back of Tunic, Fig. 2. Paper: $4\frac{1}{4}'' \times 9\frac{1}{2}''$. Points: 1 is from A, $\frac{1}{2}''$; 2 from A, $1''$; 3 from A, $2\frac{3}{4}''$; 4 from 3, $\frac{1}{2}''$; 5 from 3, $1\frac{3}{4}''$; 6 from C, $2\frac{1}{2}''$; 7 from 6, $1\frac{1}{4}''$; 4–5–7, armscye; 8 is from C, $4''$; 9 from 8, $1\frac{1}{4}''$; 10 from D, $\frac{1}{2}''$. The Sleeve, Fig. 3. Paper: $7'' \times 8''$. Note fold. Points: 1 is from C, $1\frac{3}{4}''$; 2 from D, $\frac{1}{2}''$; 3 from 2, $\frac{1}{2}''$. Cut through both thicknesses of paper from A–1 on outside curve, then curve in one side slightly for under part of sleeve. Open flat, slash at E–F, $1''$ in front of fold, to show shirt sleeve. Trousers, Fig. 4. Long and tight, and in full size must be fitted. Paper: $11'' \times 8''$. Points: 1 from A, $1\frac{1}{2}''$; 2 from C, $\frac{3}{4}''$; 3 from 2, $1''$ (the center of the front at the waist); C is center at the back. 4 is from C, $4''$; 5 is from 4, $\frac{1}{4}''$; 6 from B, $2\frac{1}{2}''$; 7 from A, $3''$; 1 to B is outside of leg. Shoe, Fig. 5. Paper, $2\frac{1}{2}'' \times 4\frac{1}{2}''$. Points: 1 is $1\frac{1}{2}''$ from A; 2 is from A, $2''$; 3 is from A, $2\frac{1}{2}''$; 4 is from 3, $\frac{3}{4}''$; 5 is from B, $1\frac{1}{4}''$; 6 is from C, $2\frac{1}{2}''$; 7 from 6 is $\frac{1}{2}''$. Curve 1–2 is pointed toe and 1–D is ankle. Point 1 is between A and C. To cut: Place Fig. 1 with line 2–B on selvage edge. Place Fig. 2, line 1–B, on lengthwise fold. Fig. 3, open out pattern and place with line A–B straight lengthwise. Fig. 4, do the same with 1–B lengthwise. Fig. 5, place 2–B on lengthwise fold. To make: Trim tunic around edges, also edges of slash in sleeves with fold of contrasting color. Finish lower edges of sleeves by gathering into wrist, leaving frill at hand. Seam leg parts of trousers before putting the two parts together, then seam two front edges 3–5 together, then back edges, C–4. Open at each side, 1–7 for placket, and finish with facing. Seam Shoe, 1–2, and 1–7 also 5–D. Seam curved edge 4–5 into curve of sole. The shirt is only seen at neck and sleeves, and the shirt-waist for the German Costume will answer for this. For the collar, that of the Swedish Costume will be correct. The hat is essentially the same as that for the Scottish Highlander Costume, substituting a soft plume for the quill. In selecting color do not hesitate to use bright hues, a vermilion being proper for one.

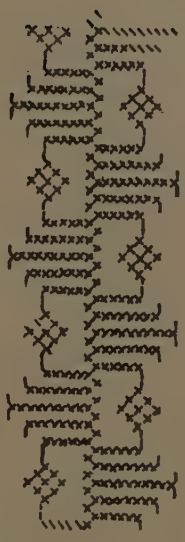
CROSS-STITCH EMBROIDERY is among the very ancient of the needle arts. The samplers of our grandmothers were collections of the designs selected and treasured by them, to be wrought into this style of work. In making, try to reduce the forms used to their simplest shape, and discard all small details of outline. Two complementary colors, one of course predominating, are best for beginners in this work, and practice in the stitches shown at the right is desirable. When the space has been selected to embroider, such as a collar and cuffs, the design should be worked out on plain paper, and when satisfactory redrawn on cross-ruled paper, where the cross-stitches must be drawn as they will appear, each square when filled representing a square of the embroidered design. The experimental drawing may be transferred to the cross-lined paper by tracing- and impression-paper, but be sure to make the lightest possible impression, as you will find the line will interfere with your coloring. Then draw out the design in full color on the cross-lined paper; if drawn with the pen, this can be filled from the brush dipped in the water color. But a fine brush may be used. Draw the stitches that slant one way all at one time, and then cross them, in order to give a regular appearance to the work. These little colored crosses will show almost exactly how the embroidered pattern will appear. Like all good design, the result should express the natural limitations of the work. What you can retain and what must be discarded will appear in preparing the design for its final stage.







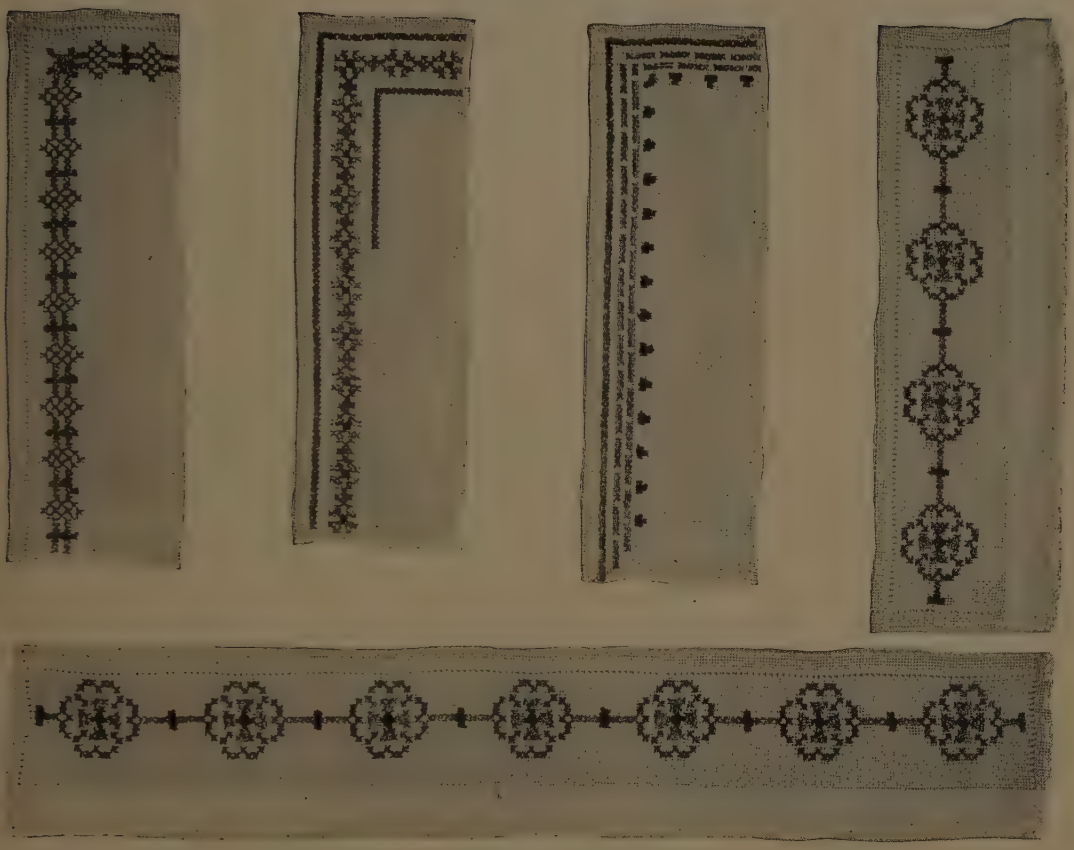




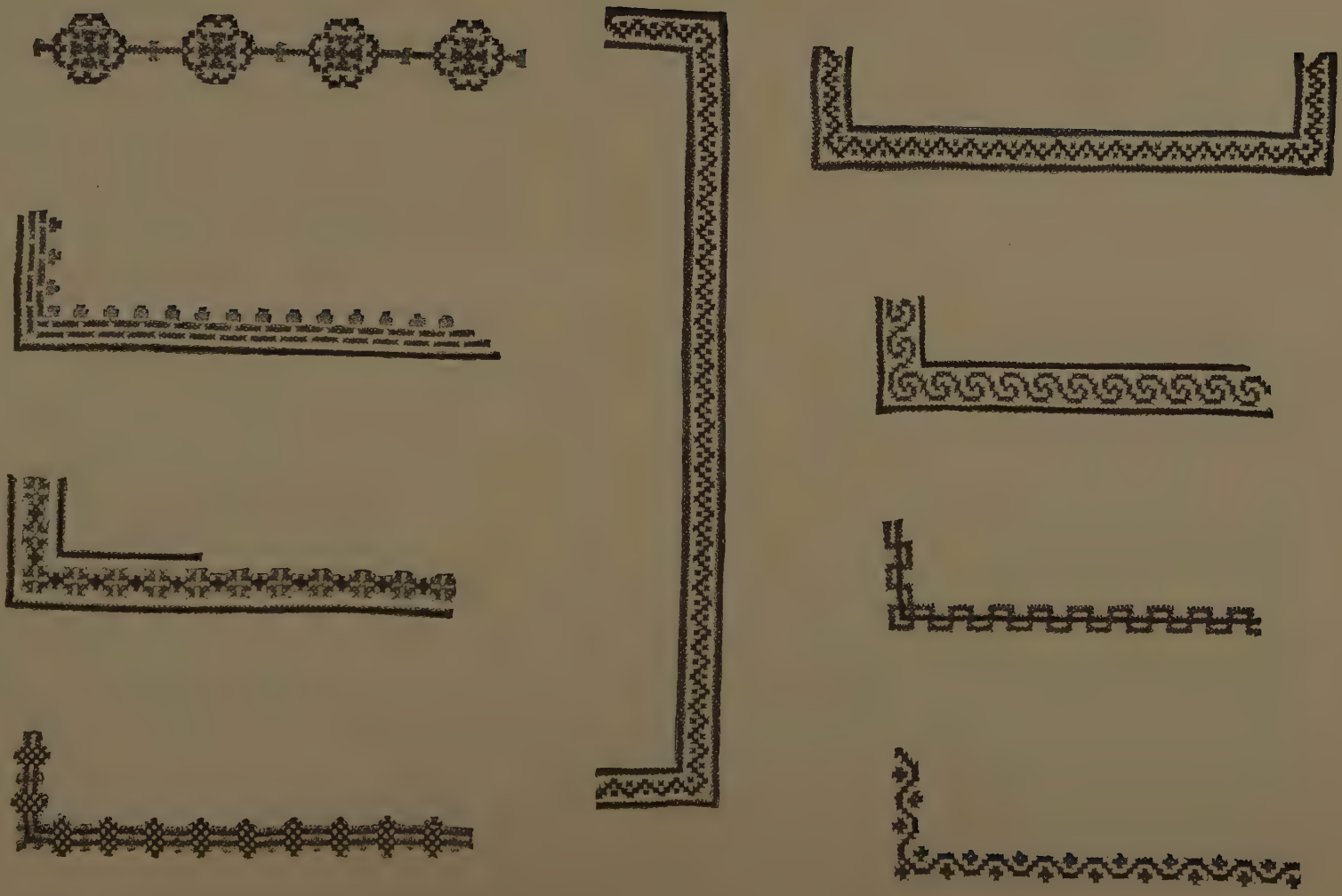
CROSS-STITCH EMBROIDERY. Some designs for vertical bands and an ornamental initial. Such borders, especially if somewhat simplified, might be embroidered upon scrim curtains. As for the initial, it is a unit which demands space in so many locations that it would be hard to enumerate them. Such bands or borders should of course, if possible, be derived from floral units, as these have a more flowing spirit, in which the movement is greater, and the sense of progression or growth more pronounced. Fig. 8, for example, is based upon the rose. The lilac, with its great number of small but very simple blossoms, each adapted to the filling of a square, as contrasted with its good-sized leaves, offers a unit for this work. But there is no end to the possible adaptation of flower forms, and in well-selected color schemes that shall embody the natural colors of the flowers with analogous or complementary border lines, if such are suitable for the unit. Consider the oak with its leaf and acorn — that wonderfully adaptable nut-form — or the seeds of the ash or maple; all these offer delightful vistas of beauty to be realized in colored silks. The revival, at the present day, of many of the arts and crafts of earlier days, has attracted attention to this art that was so much in vogue in the days of our grandfathers, and there is no reason why it should not be adapted to modern requirements. It will give to schoolgirls a chance to add a touch of individuality to their apparel and other belongings that will always be interesting to themselves and to others, and may open the way to a wider field. Its ancient lineage should also recommend it to those who love the genuine, the things that endure in spite of all changes. Specimens have come down to us of early Egyptian, Coptic and Byzantine embroidery of this sort, that are sure to make the thoughtful person stop and ask if those civilizations were, after all, so very remote and rude. One priceless fact this style of embroidery teaches to the student; for whereas in many lines of design it is often hard to hold oneself to conventional treatment, in cross-stitch it is hard to do any but conventional rendering. Note the success of the wheels in the carryall design on the page preceding. Square, conventionalized, yet wheels, clearly enough. The up-flirted tail is also well expressed. It is much easier to work on material that has a canvas weave where four threads form a square, but linen of the ordinary weave can be used in the same way, counting four threads usually to a square.

CROSS-STITCH EMBROIDERY; some applied designs. The upper design is the cushion for a chair-back for a child's room. Three trials of the face appear on page 158. The method pursued was as follows: Several small rough sketches were first made, embodying different ideas and subjects, and from these the most satisfactory one was selected. The size of the cushion was next decided upon and a suitable width set off for a border; an experimental drawing was made of the border and center

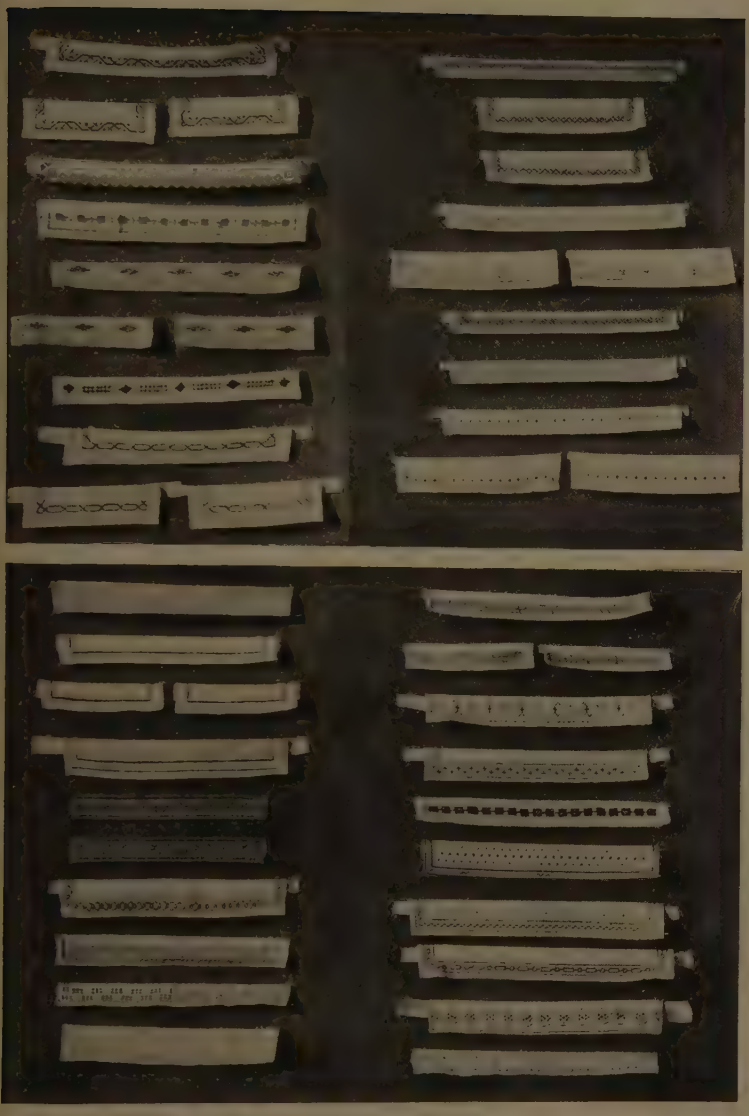
designs. All the knowledge one possesses concerning balance, harmony and rhythm can be well applied at this stage, remembering that the design is to be carried out in cross-stitch and that, "Artistic design is always expressive of its mode of workmanship." The experimental drawing was corrected, refined and transferred to the tracing-paper, and from that to the cross-lined paper, and the work of interpreting into cross-stitch begun. As many lines did not coincide with the squares on the paper, a general readjustment was made, and the design was finally adapted. The face of "Peter," as shown on page 158, is an example of the thought required from first to last. The lower illustration shows a very old sampler which was found in the city of Mexico in the spring of 1903, and is probably 150 or 200 years old. It is curious to note that a piece of cross-stitch embroidery from far-off Smyrna contains a rose pattern very similar to the one on the Mexican sampler, while the same rose is found repeatedly in English work of the seventeenth and eighteenth centuries.



Cross-stitch embroidery as applied to collars, cuffs, and other details of wearing apparel. The very best selection that can be made for such is undoubtedly that derived from geometric units or those of an extremely conventional character. On this page and the following one, of designs exclusively, are shown such work, both in the design and in finished work. The lower border shown on this page is very interestingly adapted from a Japanese unit, suggestive of the trefoil, and showing how the curved outlines of the four petal-like parts have been carried on in the angular cross-stitch. Their forms have been interpreted, not changed. In some cases it will be found helpful to draw in the designs on the cross-lined paper in square dots, filling each little square full, instead of marking in the cross-stitches with the pen or brush, though this is merely a question of which way will be found easier to do. The selection of color is an important consideration, it being desirable to have the principal parts of a design accented by a stronger or more intense tone. It is generally safe to use the softest tones in the largest quantities, reserving the most brilliant ones for emphasis. If complementary colors are chosen for a design, care must be taken that these are not used in equal quantities, as has been already stated. The scheme may be handled as in any design or painting, either analogous, complementary or self-color — shades of the same color. A complementary color scheme employs two colors, as red and a blue-green, blue and a yellow-red or orange, yellow and purple-blue or violet. An analogous scheme uses colors related by hue, such as red and a yellow-red. As a rule, however, colors contrasting to some degree are best. Some designs are better with margin lines, while others are better without them. Often the effect of a design may be wholly changed by the use of margin lines.

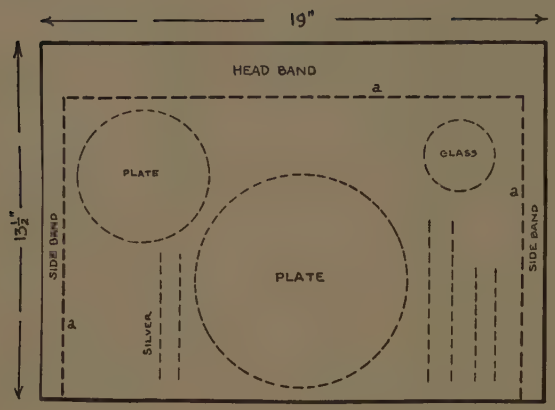


SOME GOOD BORDERS IN CROSS-STITCH EMBROIDERIES

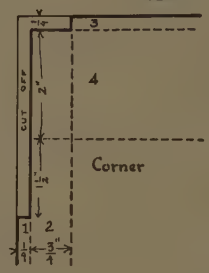


COLORING IN CROSS-STITCH EMBROIDERY. Here are forty-five pieces and sets of work in Applied Cross-stitch Embroidery. These are designed as collars and cuffs for women's garments, and show the great and beautiful variety possible in the use of simple units. No two are alike, yet many are related to a common unit. Here the geometric form is most adaptable; the cross, square, triangle, lozenge, concentric squares, the oblong, separate or linked, the Greek fret, and an unnumbered host suggested by a mention of these, all lend themselves readily to adaptation.

The coloring in cross-stitch embroidery is a problem not easily solved unless one works on a basis of principles. There are three principal types of harmonious coloring: First the monochromatic. In this type the color of the dress goods is repeated in the embroidery, lighter or darker, or both. The second is the analogous type of coloring. In this the colors of the embroidery are closely related to, that is, analogous to, the color of the goods. For example, if the goods were brown, the embroidery might be yellow or orange. The third type of coloring is complementary. The colors used in the embroidery would harmonize with the dress goods by contrast. The pairs of contrasting colors are: red and blue-green, yellow and purple-blue, green and red-purple, blue and yellow-red, or orange, purple and green-yellow. In making the complementary combination one color should be dominant; that is to say, there should be a large amount of one color and a small amount of its contrasting color. If the embroidery is placed upon a white ground, the white is, of course, the dominant note and the relative amounts of the complementary colors may be more nearly equal. It is well also to remember in making complementary combinations that the more brilliant color should be used in the smaller areas. In any case the colors should be so disposed throughout the design that the design strikes the eye as a whole first; no part should be obtrusive. Very beautiful can these little colored embroideries be made. In any color decoration of costume, the bright colors, used sparingly, have somewhat the effect of gems.

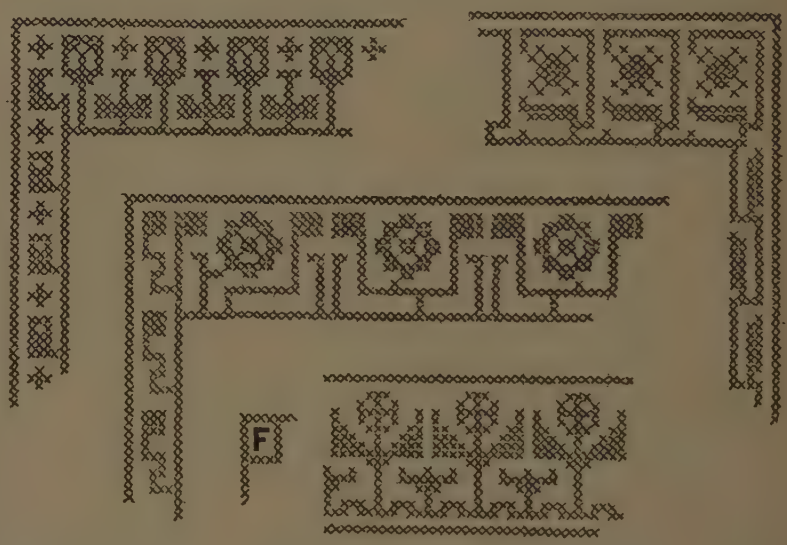


A Place Cloth with decorative borders. F

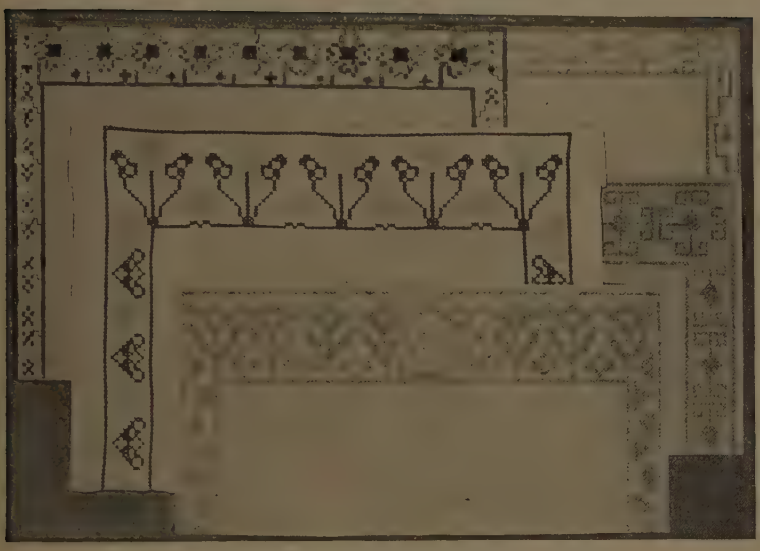


A PLACE CLOTH OR INDIVIDUAL TABLECLOTH, to be worked in cross-stitch. This is a substitute for the various mats and doilies used when the tablecloth is dispensed with. It should be of linen, large enough to contain the plate, bread plate, glass and silver required for one person at a meal. A good form would measure 13½″ × 19″. Hem neatly 3 sides, as shown by the dotted lines. The ornament at each end should be narrow and may be a "vertical border." The top, or head, should have a wider and richer "horizontal" border. The fourth side should be the selvage, without ornament. The side borders may be ¾″ wide, and the head from 1½″ to 2″ wide. First make a dummy cloth from a sheet of thin, tough wrapping paper, 15¾″ × 21″. Turn under ¼″ on the three sides to be hemmed; turn under again for the hem proper, 2″ at top and ¾″ at sides. Plan just how the corners shall be folded, cut, and felled. Note the method suggested at F. Fold over the parts in the order indicated by the numerals. On the upper side of sheet draw pencil lines to show the exact position of the edge of each hem as seen in dotted lines at *a a a*. Sketch out and select your design elements, and whatever these may be, remember that they must be "squared up," to be worked in cross-stitch. Lay out lightly on the dummy, to find the number of repeats. Make trial sketches on cross-lined paper to see how it will work out in the stitch. Lastly, see that the color is good.

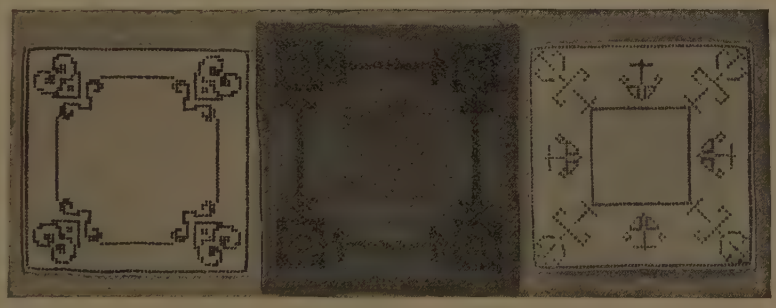
Details for the PLACE CLOTH. With the dummy as a pattern lay out the design on the linen. This may best be done by stretching the linen taut upon a drawing board, keeping it in place with thumb tacks. Upon this, work delicately with a pencil of the color of the thread to be used in the embroidery. Make not one unnecessary touch with the pencil. The illustrations show



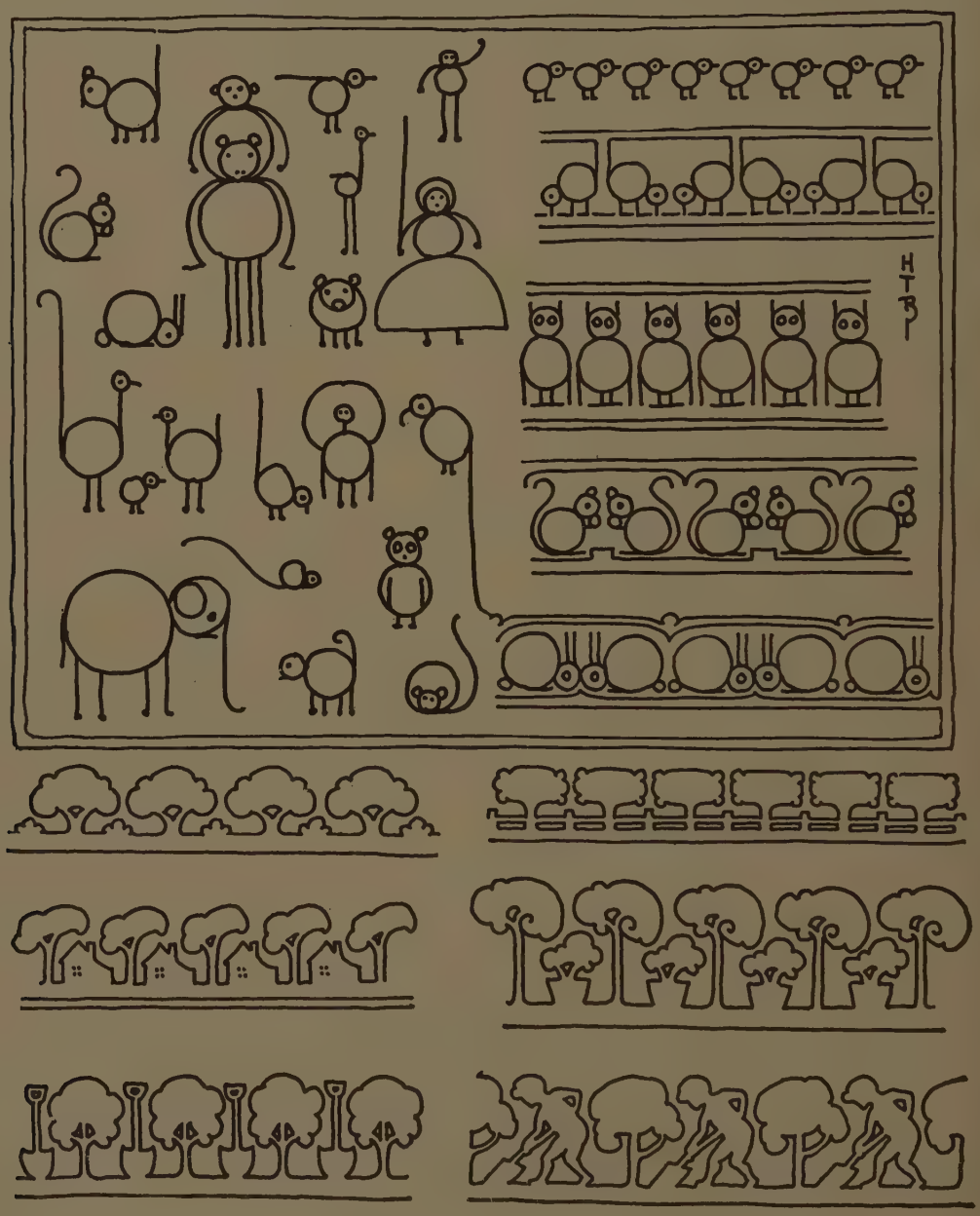
four borders drawn upon squared paper. Three of the designs show the graceful turning of the corner, the transition from the narrow side border to broad head band. These designs are all intended to be worked in two colors, of very low intensity, and of but slight contrast with the white ground. They must not be staring decorations. That is the office of a label—to arrest your attention. These should attract, not arrest. The mere working of a corner may seem a matter of slight importance, but right here lies one of the secrets of good design, successful adaptation.



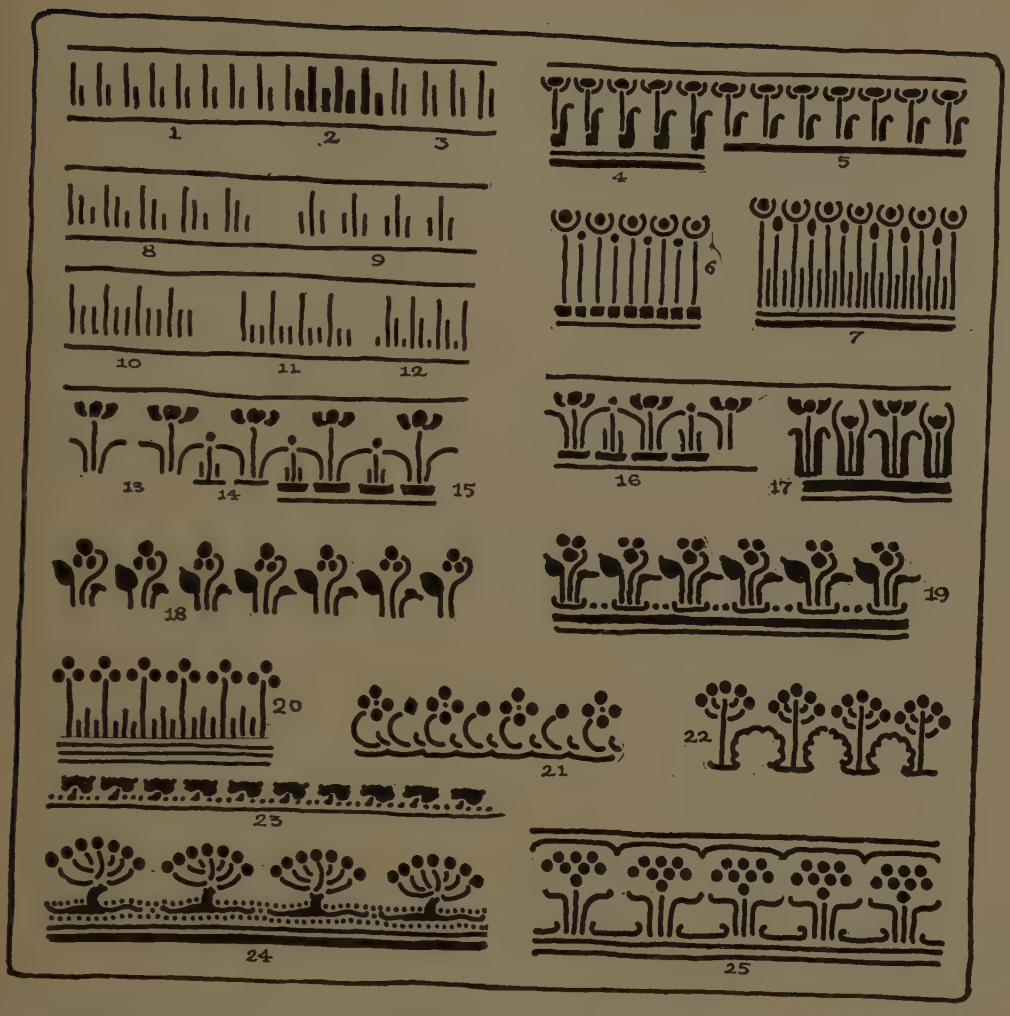
Examples of good PLACE CLOTHS, worked out by pupils of a seventh grade public school. The variety in the designs speaks well for the methods taught in this school, wherever it may be. Such work — or any work — is sure to be better for being original. Where doilies are to be used, cross-stitch offers one of the most attractive means for ornamentation. The three shown in the middle illustration were also the work of thirteen-year-old school children, the patterns made from their own designs, the themes worked out first upon squared paper, and the color schemes carefully studied out by means of colored pencil trials. The three doilies show two applied designs of the square, one where the empty space of the center is emphasized by the margin lines based on the square, the other where the square itself is made the theme, occupying with equal emphasis the space devoted in the first one to the empty square. The lowest illustration shows some of the squares worked out by children eleven years of age, for the borders of a BED SPREAD. This spread can be made for either a single or double bed, but a good idea is to plan it for some hospital which has a children's room. Each child worked a square and these were then sewed together. The spread is made of five principal parts, the center-piece, which rests on top of the bed, the three flounces, for either side and the foot, and a head piece. The center-piece is the one surrounded by the worked squares. A good size spread for a single bed will measure 6′–2″ wide and 8′–0″ long. Of this width each side flounce takes up 1′–8″, and the center-piece 2′–10″. The foot flounce also measures 1′–8″ deep. This particular spread had the center-piece bordered on all sides with a strip of 3″ width outside of the squares. These numbered six across the head and foot of the center-piece respectively, and nine along each side. The birds are done in outline stitch.



The units used in outline stitch may be infinitely varied but should be consistent in character throughout each design. On this page, this page have natural motifs, while those on page 168 are purely geometric in character with vertical, horizontal, and oblique lines



for instance, the units of the upper part are made up of circular curves, straight lines, and dots only. Other examples of the same kind are shown on page 167. The other designs on only. The upper part of page 167 gives further suggestions for embroidered patterns into which solid embroidery is introduced. These illustrate also certain principles of design dealt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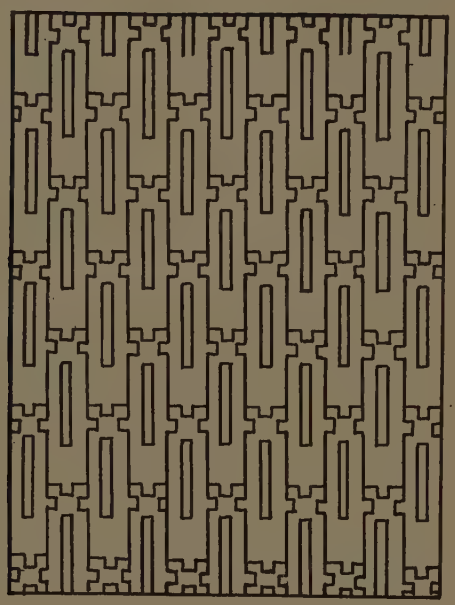
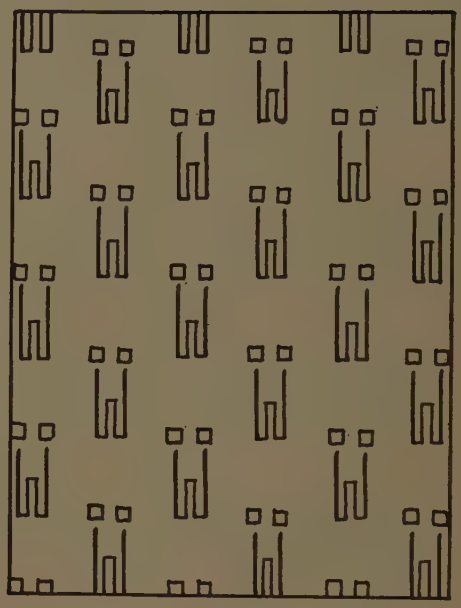
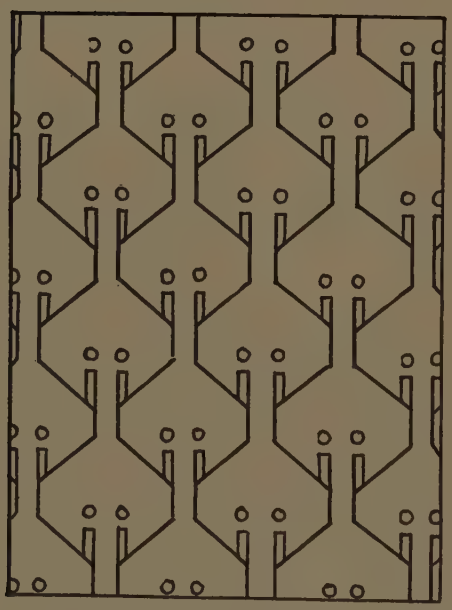
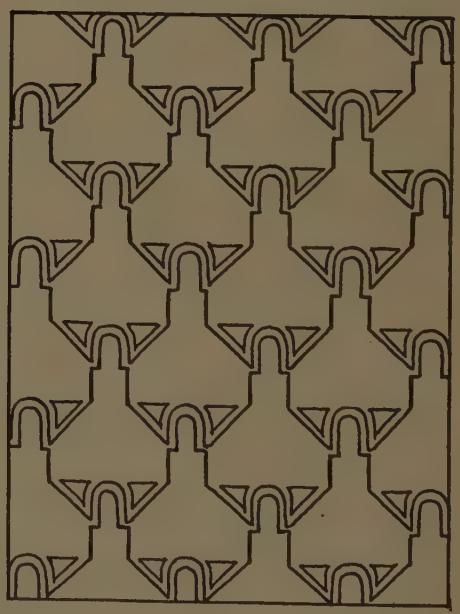
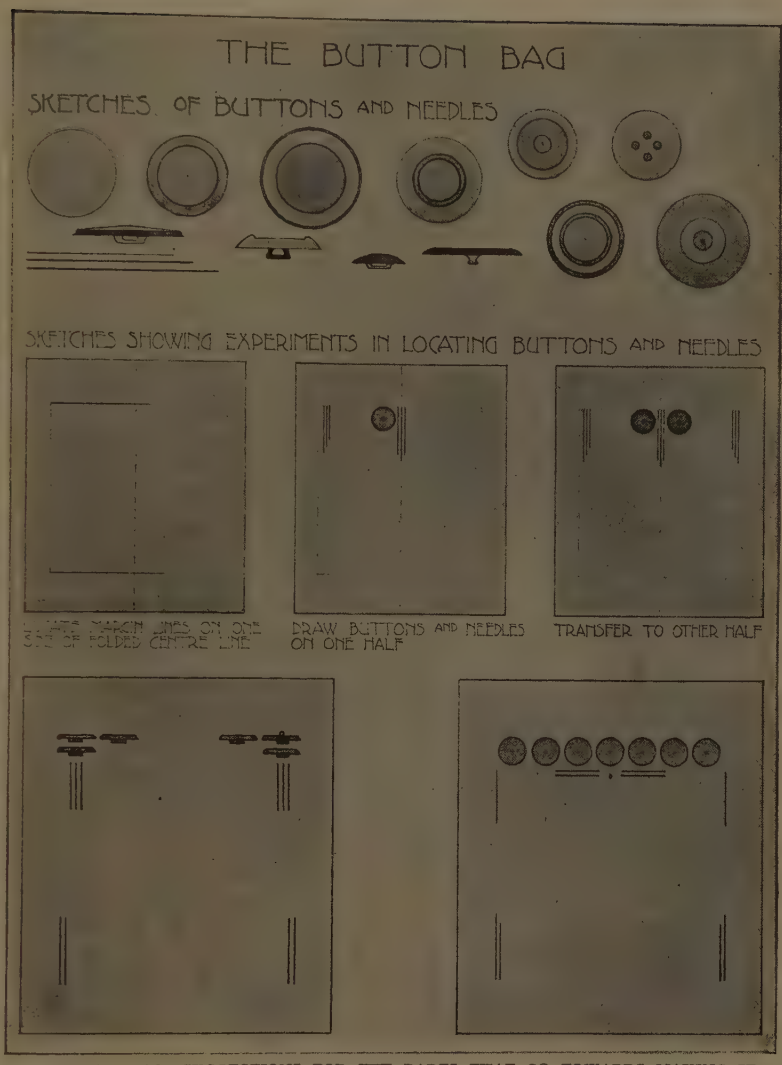








with in the chapter on "Decorative Design." They illustrate the various effects of heavy and light units, units closely packed or spread apart, and of units having a similar or a contrasting character repeated with and without marginal lines. Such patterns are good for the ornamental bands upon table runners, sash curtains, and embroidered bands for wearing apparel. The units must be so grouped that the eye is conscious of a pleasant movement throughout the design. In a good border one is never tempted to count the spots; each unit is so related to its neighbors that the eye is gracefully conducted from one unit to another.


THE BUTTON BAG
SKETCHES OF BUTTONS AND NEEDLES
SKETCHES SHOWING EXPERIMENTS IN LOCATING BUTTONS AND NEEDLES
DRAW BUTTONS AND NEEDLES ON ONE HALF
TRANSFER TO OTHER HALF

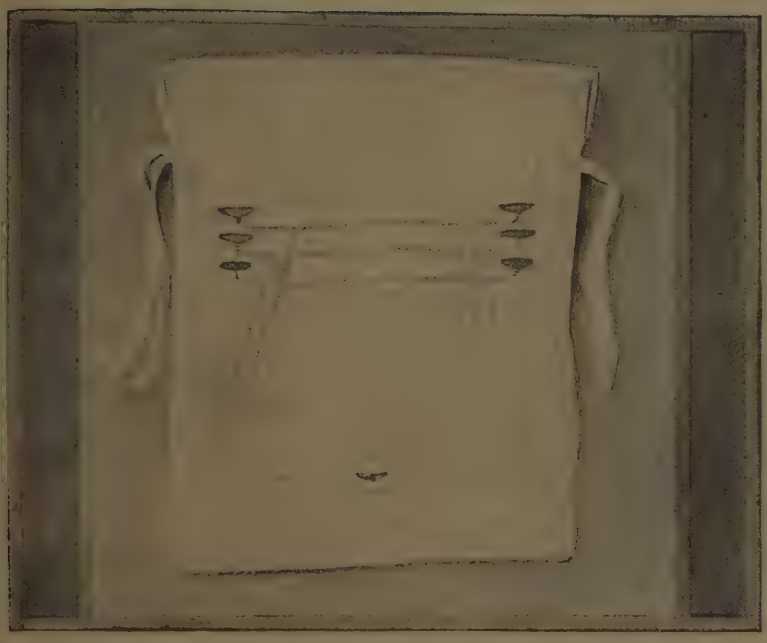
A BUTTON BAG: SUGGESTIONS FOR THE PARTS THAT GO TOWARDS MAKING IT

A BUTTON BAG, TASTEFULLY DECORATED. To make the button bag, the general directions for the washcloth bag will suffice, though this need not be lined like the washcloth bag. This page is concerned mostly with its decoration, which in the picture is marked by fitness to purpose, the units of the design being taken from what the bag is meant to hold, buttons and thread. Needles might be added.

Make careful drawings of the buttons you like best, selecting those which are simple and attractive, not those cast in metal nor studded with cheap glass gems. Cut several pieces of paper of the exact size the bag is to be. Fold them vertically in the center. Allow wide margins at top and bottom because of the cloth puckered by the drawstring, and the weight of the buttons which will crowd down the lower sides out of sight. Distribute your centers of interest so that one shall be chief. In this particular problem it would seem well to locate this near the top, and perhaps in the center, horizontally, or it may be in the center of the available space. Try it and see which looks the better. Now sketch in one or more buttons where you think they will look well, and maybe add an effect of the needles in the shape of horizontal lines in pairs or triplets, or more numerously. Keep all within a good-sized marginal space. If you employ lines to suggest the threads, see that they connect the buttons one with another and run through the eyes of your needles, if you develop needles as a part of the design. Shall we show the buttons edgewise or full-face view, or a combination of both? Such questions will rise up for solution. Do not overload the design. Keep the interest well centered in one locality. Do this work on one half of the paper, to right or left of the vertical fold. Then fold on this center, with the drawing side folded in on top, and rub on the back or upper side with the unsharpened end of the pencil, which will transfer the drawing to the other half with no bother of tracing paper. Line in the faint impression, and you can see how the whole balances. Transfer the whole design to a sheet of white drawing paper and prepare for the color scheme, which should be simple,

a good one being of an analogous harmony in green and green-yellow, thus keeping close to the prevalent yellowish tone of the linen of the bag. When you have worked out the color to your satisfaction, so that it arrests the eye as a harmonious and restful whole, it may be transferred to the cloth of the bag by tacking it over the cloth with thumb tacks, and using a sheet of carbon impression paper between. The painted design may be embroidered in outline, using embroidery cotton or silk. One effective way would be to paint the buttons on a design such as the one shown, and embroider the thread lines only. In painting such a design, care must be taken to see that the color does not run. The brush must be kept rather "dry," that is, do not have it full of color; use only a little. Colors made of aniline dyes would answer for this sort of painting. It would need but a few grains of the dye powder, dissolved in hot water, to give an ample quantity.

The designs upon page 169 and this page illustrate a principle worth keeping in mind; namely, that the ornament applied to any common object should have some relation to the character of the use of the object. A design made of abstract spots equally appropriate to all sorts of conditions is peculiarly appropriate to none, and therefore usually falls short of being a satisfactory form of enrichment. In this case, buttons, threads and needles are the only motifs in the designs. The superiority of these designs over those shown in the plate on page 171 now becomes evident. The button bag designs were made by a well-trained designer. The objects shown in the other plate were designed by grammar school children. Considering the fact that the children were of but ten years of age on the average, the work is excellent if not ideal. These school bags might have had ornamentation related to their purpose. A border of interwoven letters or figures, or of conventional books, or of objects constantly in use in the schoolroom properly conventionalized and grouped would have been not only more appropriate but more beautiful than the detached abstract units the children were al-

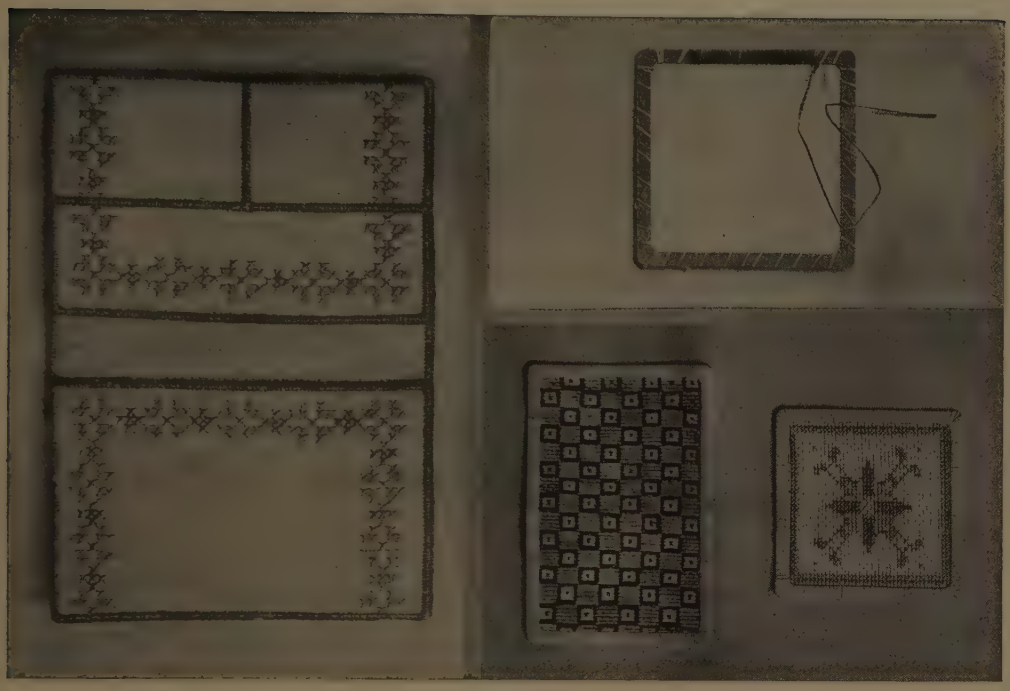


lowed to use. These designs by the children also illustrate another common failure in amateur work; namely, the failure to secure harmony of effect. In almost every case the contrast between the ornamental detail and the ground upon which it has been worked is too great. As a result, the lines of the ornament attract too much attention. You think of the ornament with a bag underneath it rather than a bag well ornamented. Another element which aggravates the inharmonious condition in many cases is lack of scale. The ornament is too bold and strong for use for so small an object. An object to be held in the hand does not require an ornament which announces its presence by shouting aloud. The secret of producing satisfactory effects in handicraft work of every sort lies in the word "Adjustment." Part must be happily adjusted to part, in form, in color, and in position as well as in character.

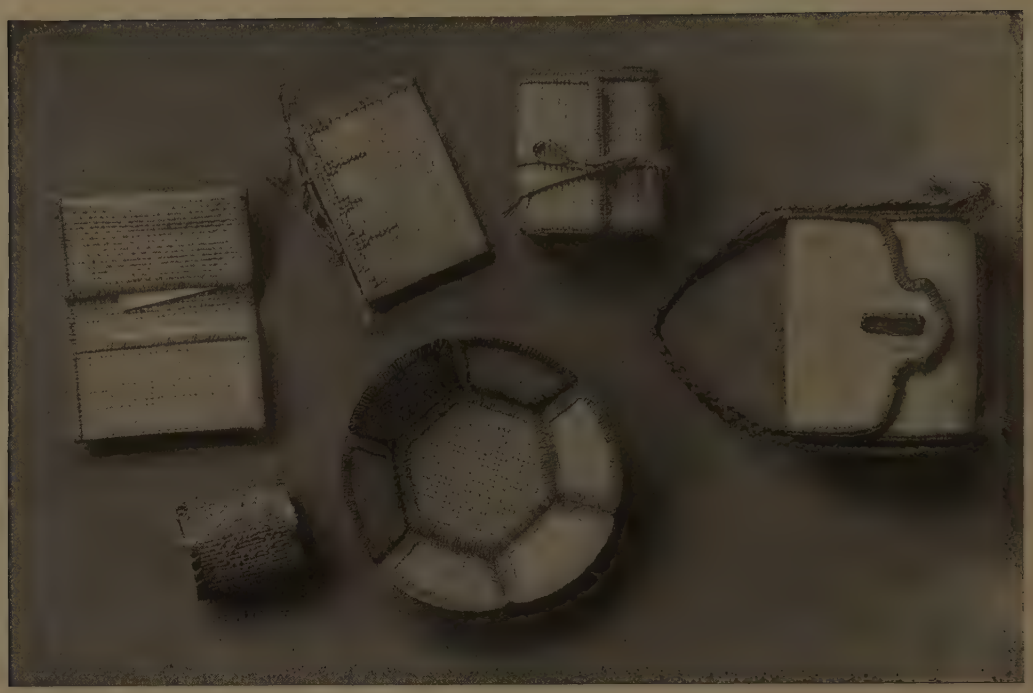
BURLAP MATS, EMBROIDERED WITH LINEN IN OUTLINE STITCH. Burlap, after its discovery as a decorative material, soon offered a limitless field of usefulness. This includes mats and cushions destined to exposure to the weather, as in the canoe, on the porch table or at the summer camp. In fact, in almost any situation where durability is the end in view, burlap vies with leather in its wearing qualities.

That shown in the upper illustration is made of a burlap with a green-yellow ground on which is worked in outline stitch a circle of units derived from that useful part of written speech, the comma. How appropriate for a set of chair cushions for a Reception Room! And why not other designs made with the punctuation-mark family as a prolific inspiration? The exclamation- and interrogation-points surely offer rich promise. This mat was made by striking out the circle for its margin and working this in outline stitch, the rope-stitch form being used. There is a double line, the outermost being of blue and black, the inner of yellow and black. The outside circle for the fringe may be described at this point, though it is full as well to wait until the design is completed. This should be carefully studied out, full size, on manila paper, traced, and applied to the material. If you attempt to tack down the paper pattern and work through it, the task of removing the paper from the small squares of the stitch will prove tiresome, to say the least. This pattern was traced and worked upon the burlap, the body of each unit worked with a simple outline stitch crossing at right angles, caught where the threads cross with a small tight stitch of the complementary color; one-half the units being done in yellow, caught with blue, the other half of blue caught with yellow. The blue used is the more intense of the two. The last step was the fringing out of the edges. The lower illustration shows another method of treating the burlap. Here the decorative band has the design worked in outline stitch, with the ground about the figures tinted a darker shade of the same hue. The stitch employed to outline the figures is here done with a coarser linen, laid on and caught down with strong black linen thread. The burlap is a green one-third neutralized by the admixture of red, and of low intensity. The dark part is stained a shade

darker of the same hue. This might be varied by tinting the surfaces of the objects a hue suggestive of their color. What a fine opportunity to produce a set of such mats, showing the commoner table fruits of the year. For winter you might design a border of bananas or another of oranges. For summer or fall, use the home fruits.



Objects made of TILO MATTING. Tilo is a woven material somewhat akin to burlap in the color effects to be had from it. It is a soft, pliable matting of checker weave made from the rolled shavings of the Japanese fir tree, in the natural wood color. It readily absorbs the tube dyes that mix with cold water, and so is quickly colored. It can be made into mats for table, desk or pantry, needle-books, napkin rings, boxes, baskets, portfolios, music rolls, porch cushions and fire screens. Raffia is used for working patterns into the Tilo. All kinds of needle-work stitches, lace and weaving stitches and macramé knottings can be used. With it the very little folks can make tasteful and attractive articles for holiday gifts, such as mats, card cases, napkin rings and needle-books, always, of course, under instruction. The older person of fine taste will find in it a source of endless delight. The articles shown in the picture are as follows: upper right-hand object, an unfinished mat, showing the use of strawboard edge for the mat border; lower right-hand object, such a mat, completed and decorated with raffia weaving; beside it, a checkered mat made in the same way, but decorated with a pattern drawn in water colors. (In large surfaces, dyes are much to be preferred.) Left-hand half of picture, a portfolio made of Tilo and decorated with a design in raffia. There are several devices employed to keep the edges of these mats from raveling, among them being the use of the cardboard frame or edge-form, as shown, over which the raffia or strands of the Tilo are bound, and this edge is glued to the mat or caught with a few stitches. Machine stitching may be used to prevent this raveling. Strands of the Tilo are a yard in length and of a thickness which makes them admirable for braiding. The ravelings may be used for braiding to be sewn into mats, baskets, etc. On account of uniform thickness Tilo matting strands can be braided with much less difficulty than raffia. When a strand is dampened and unrolled it makes a good ribbon to provide binding for a needle-book, napkin ring or other articles. The picture on page 174 shows several finished objects, made in the public schools of one of the cities of the Middle West. As the work of grade children these are remarkable instances of thoughtful planning and nice workmanship. Here are shown a card case,



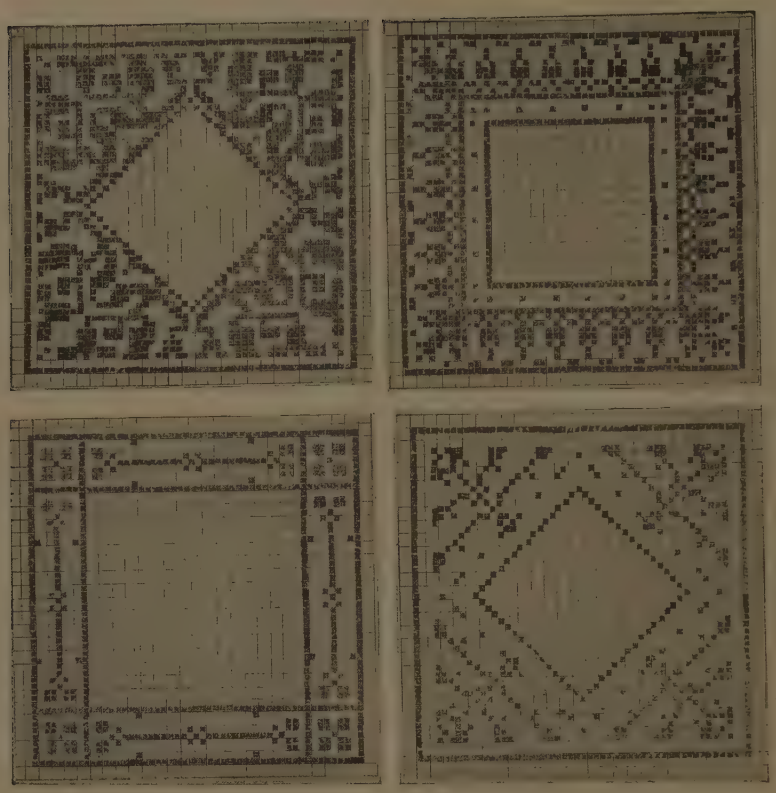
a needle-book, pin roll, purse, napkin ring and card receiver, or work basket. Another way in which to finish the edges and keep them from raveling is here shown, the use of the oval pith-edge material. This is wound with raffia in the present case, and the resulting edge is attractive and durable. A very familiar article might be made in this way, a checkerboard. The squares might either be painted on in dyes or water colors or woven in raffia of the dark color needed for the "black" squares of this ancient game-board. A folding backgammon board is another game which would lend its peculiar triangular marks to decoration in color in this medium. The boy who likes to experiment with form, who tries with splendid courage to fashion a suit case, a hand bag, or a tool bag, such as the carpenters in England use, will find in Tilo a rich storehouse of possibilities. Perhaps the most richly suggestive of all is the screen, mentioned above. In whatever height this is made, for actual use by the fireside, or in miniature, to shut off the glare of the lamp from an invalid, it offers boundless possibilities for beautiful design in the raffia or Tilo strips. There is about matting of the Oriental order something especially appealing, as it is one of the things foreign which anyone can afford, and which is at the same time beautiful and durable. Matting has been the chief household furnishing for the barbarous and savage peoples from time out of record or memory. Our American Indians so furnished their wigwam dwellings, and it was upon mats that the kindly English settlers found them lying in the stress of the great small-pox plague. Without their mats it is difficult to imagine the East Indian, the Chinaman, or our polite western neighbors, the Japanese, from whose land comes the Tilo matting. Wherever an effect of summer coolness is desired, the mat has abundant excuse for being, and where most used is most attractive. In learning to make Tilo matting you are mastering one phase of a world-wide craft as old as civilization and indispensable to the human race. The very first woven things were probably mats made of the long leaves of grass or of rushes. The Japanese weave crates of bamboo, the Arabs hampers of palm leaves, the Indians baskets of ash and willow strips, and snowshoe fillings of green-hide.

The two hand bags on this page are two different styles. One is similar to that of a music roll; the other more like an old-fashioned carpet bag, or a modern school bag. The first is adapted to anything that will roll, like sheet music, or manuscript, or cloth of any kind. The second is adapted to stiff things, like books and lunch boxes.

In making bags, the color problem deserves close attention. In the first place the color of the material should be rather dull and unobtrusive, otherwise one soon becomes tired of it. In the second place the additions in the form of ornament should harmonize with the structural material. If the material is rather dark, the ornament may be slightly lighter; if it is light, the ornament may be slightly darker. In either case the contrast should not be too great, otherwise it becomes tiresome. The color of the ornament would better harmonize by analogy with the structural color or be a soft tone of that color. If complementary tones are introduced at all they should be in very small brilliant touches like jewels added to the general color schemes, or else of very low intensity that is dull and unobtrusive in character.

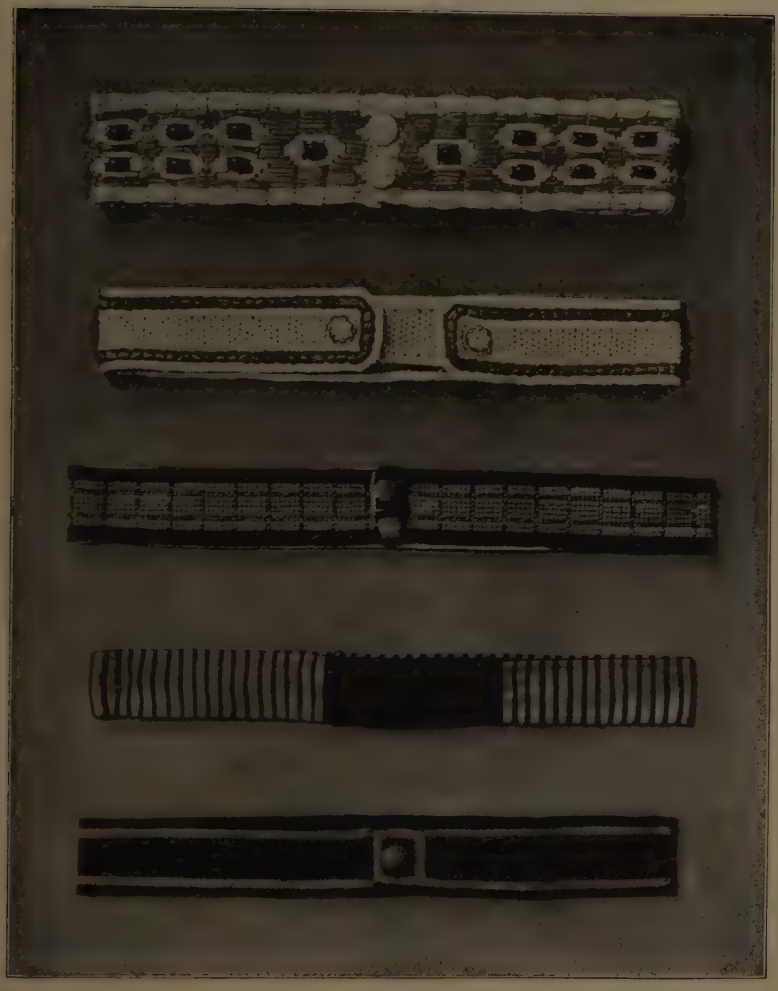
The richest possible harmony of color consistent with the function of the hand bag is that produced by using two tones analogous to the structural color of the bag, one slightly warmer and the other slightly cooler than that color, and then by introducing into this combination two or three closely related tones of contrasting hues. For example, if the bag be of tan-colored material the principal areas of the design might be in a more reddish tan and a more yellowish tan. Small brilliant dots of blue-green, blue, and purple-blue added to this combination would give it richness and brilliancy without making the whole obtrusive.

The secret in any good combination of color is a combination which strikes the eye as a whole. Any element of form or color in a design which thrusts itself upon the attention of the observer is a blemish. Each should play its part unobtrusively in the making up of the total effect. Needless to add that total effect should have a dominant hue of its own, appropriate to the object. In the case of these satchels that hue might well be the natural color of the structural material. The colored burlaps may well be considered in this connection. These are commonly sold in shades of the colors in ordinary use, in tones of low intensity which offer delightful suggestions to the color student.



is shown in the illustration. The nine SOFA PILLOWS were planned and worked out by children in Germany, in the city of Darmstadt. They offer good motifs for designs that might be executed in any one of several materials. They might be stenciled upon buckram, binders' linen, burlap (for rough use) or leather. They might be done in applied work; that in the lower left-hand corner offers a charming surface and form for outline stitch. The designs of the upper left and lower right are of the order of the best in American patchwork quilts. They are all charmingly simple, based upon the circle and square. The art of printing upon wood after the fashion of the table mats is the oldest form of printing known, the Chinese having discovered it centuries ago.

TABLE MATS stamped with a square peg. Here the pattern for a cross-stitch design was produced by hand printing, the pegtype being dipped in the color and applied to the squared paper. To produce these a square of manila paper was cut 9″ on a side, and within this another square was drawn 8″ on a side. One-half inch all round was left to allow for the hem in the finished work. The center is found by drawing the diagonals of the square, and in some cases the diameters. The inner squares were then planned upon these diameters or diagonals. The ornament is to be confined between the inner and outer squares, for an object is supposed to occupy the center of the mat, which is therefore left without ornament. The pattern may be in the form of borders, rosettes or surface patterns. An example of each kind

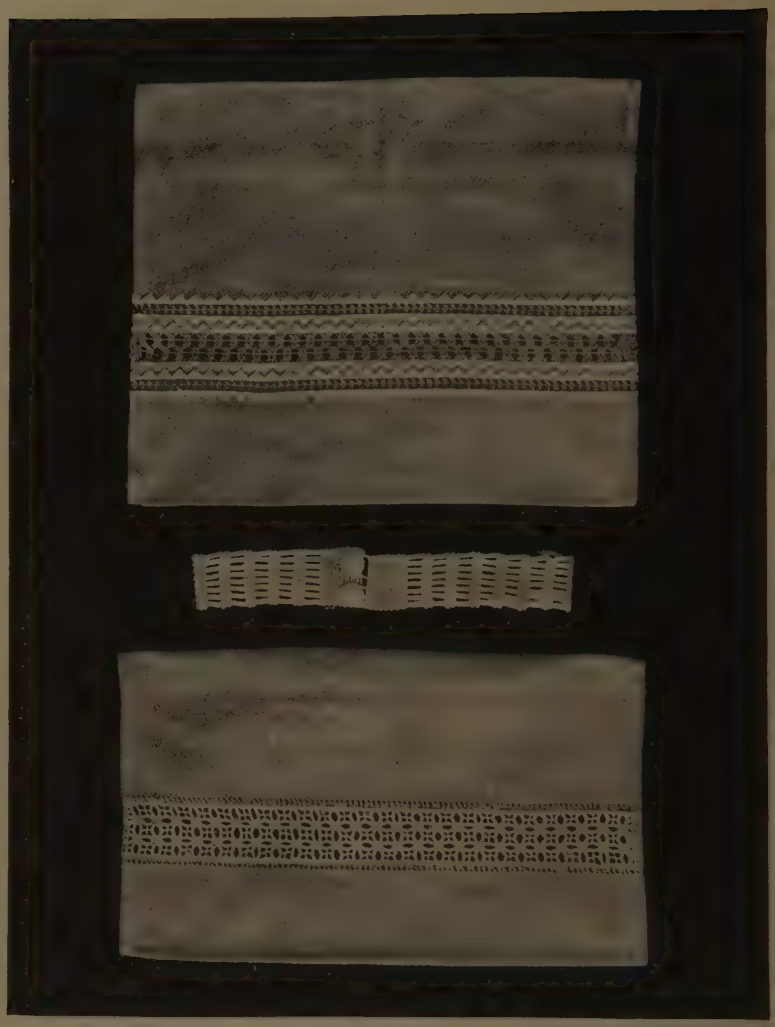


In recent years the Germans have been producing fine needlework, not only in their manufactories and in many a home, but in the public schools throughout the empire and in special schools of applied design. On this page are shown five examples of fine needlework of various kinds for BELTS. In all but one of these designs the theory of belt design is well exemplified; namely, that inasmuch as a plate is supposed to hold together securely whatever is inside it, the dominant lines in the design should be horizontal, suggesting bands or cords. In these designs, various kinds of embroidery are to be seen, and in one piece have been introduced to give accents of color. The lower plate on the page shows a covering for an IVORY FAN, made merely for the purpose of protection, but enriched to suggest the value of that which it contains. This is an example of solid embroidery in various colors. It is an example also of the linking together of the parts of a design to form an effective whole. The work shown on pages 178 and 181 is fairly representative of fine German needlework in articles of clothing. The illustration on the lower part of page 178 shows the application of needlework in rather complex schemes of coloring to the cloth covers of gift books, or of books of special value highly prized by their owners. Nothing is too good for a priceless book. The plate shows also two designs for table mats made over circular cardboard or fiber of some kind. In work of this kind the embroidery is of course applied upon the cloth before the cloth is applied to

the board. After the decorated cloth is held securely in place by basting on the inside, a piece of plain cloth, hemmed to exactly the right size, is then sewed in all round to obscure the back of the piece and to give it a satisfactory finish.

The articles of apparel, shown on pages 179, 180 and 181, show a simplicity of design, a temperate use of ornament, and a skill in needlework heartily welcome to cultivated eyes, wearied with the cheaply-made, over-decorated goods which flood our department stores.

A little appropriate ornament — ornament having a character determined by the material and the processes appropriate to it, ornament well placed with reference to the object as a whole and its uses — gives perpetual satisfaction not only to the person who produced it, but to all who have seeing eyes. At an international congress of art teachers, held in London in 1908, the delegates were given a reception at the South Kensington Museum, where some of the first families of England were represented in the receiving line. Among the delegates were two German drawing teachers with their wives. These women wore gowns designed by their husbands and made throughout by themselves. The gowns were perfectly related to the lines of the figure in each case; and, in color, to the complexion of the wearer.



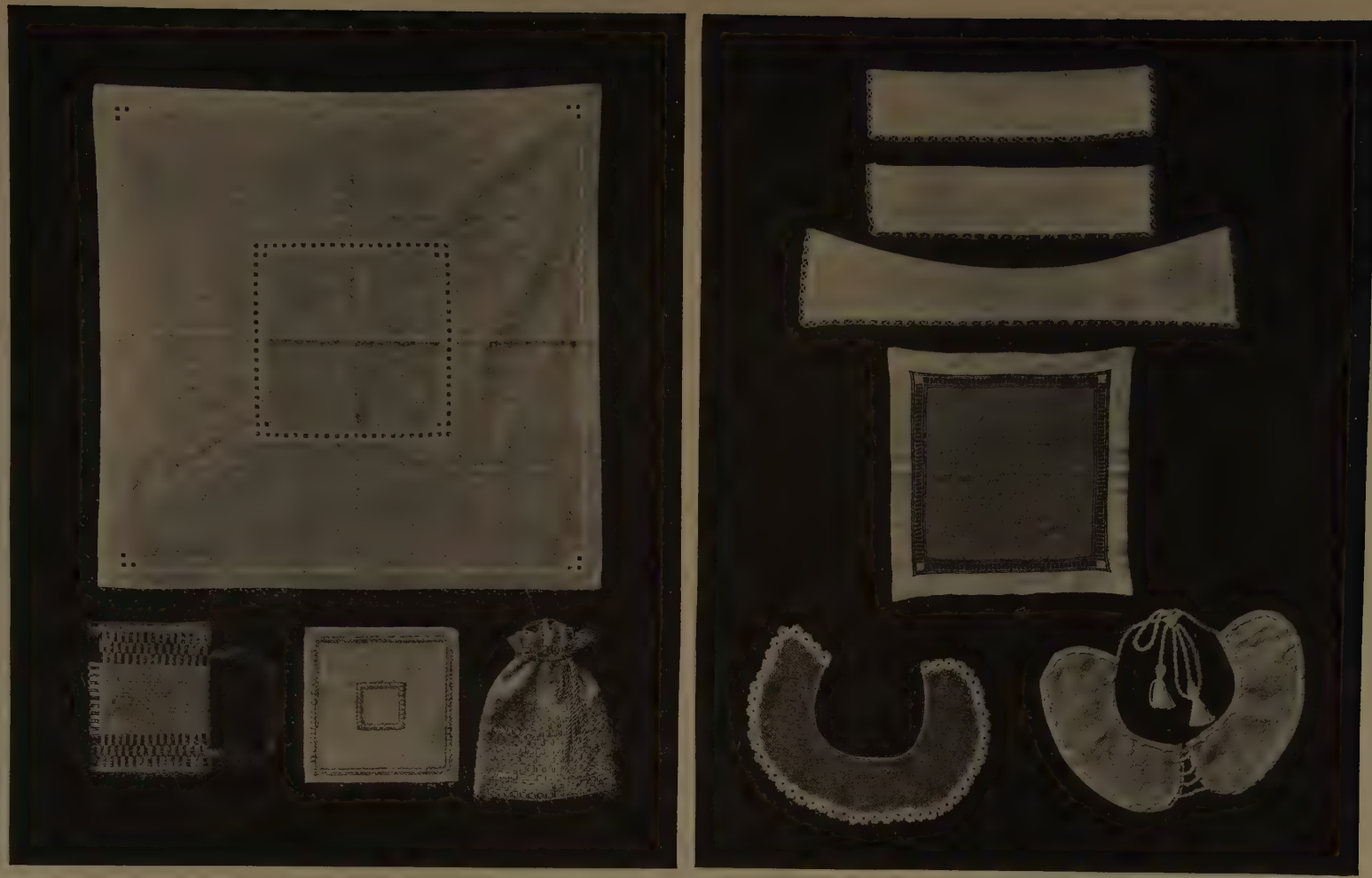


TABLE MATS, A DOILY, COLLARS AND CUFFS, AND HAND BAGS IN FINE NEEDLEWORK WITH CORDS, RIBBONS AND BEADS BY GERMAN STUDENTS

ARTICLES OF CLOTHING AND HAND BAGS SKILLFULLY WROUGHT BY GERMAN STUDENTS FROM COMMONPLACE MATERIALS TASTEFULLY AND HARMONIOUSLY COMBINED

ARTICLES OF CLOTHING DESIGNED AND MADE BY GERMAN STUDENTS

They were enriched with exquisite needlework, to the surprise of many an aristocratic Englishwoman. These two German women attracted more attention than duchesses. Machine-made finery, purchased ready-made, though loaded with jewels, looked tawdry and adventitious compared with the beautiful handicraft charged with personality and good taste.

The hood illustrated on this page shows heavy line stitch embroidery forming a conventional rose pattern of unusual character. Examples of lace, designed and wrought by German students, are also shown.

While these two patterns are far too complicated for the amateur to attempt, they are given here as a suggestion of what young people might do if they were properly taught in the schools or homes of our own country. One can learn the simpler forms of lace in a very few lessons, and thereby acquire the rudiments of one of the finest arts in the whole realm of needlework. A little practice in lace making gives one an insight into the craft, and opens the door to the keen enjoyment to be derived from the priceless treasures in lace to be found in our museums.

Well-trained teachers of lace making are, fortunately, beginning to appear in the United States, and the lace-making industries are being revived, notably in Minnesota. Certainly it is better to spend one's time in producing useful and beautiful things for the enjoyment of one's self and one's friends than to waste it in frivolous amusement.

Lace work is not difficult. The simpler forms require a comparatively inexpensive outfit, and the processes may be learned from a good teacher in one or two lessons of an hour each. Having mastered the elements of the craft, progress is easy. The results are so beautiful they become positively fascinating. A few moments a day will soon yield enough lace to enrich a gown.

RUG DESIGN BY DREWY LANSON (AGE 8). AWARDED A FIRST PRIZE BY THE AMERICAN CRAYON CO.

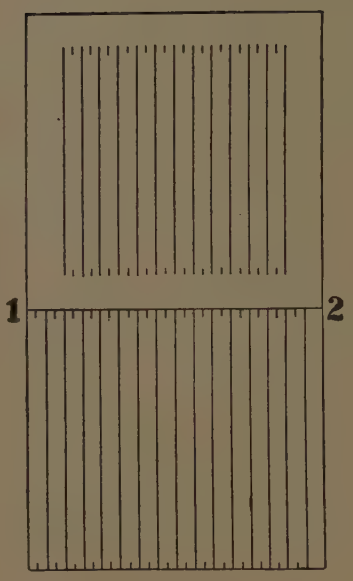
HARMONIOUS COLORING

The color plates in this volume illustrate not only various kinds of handicraft, but also the typical harmonies of color. Color is pleasing in itself (see plate at page 361). Of the nine spots, shown above the bowl, that is most pleasing which exhibits the greatest variety without losing its unity. Color presents varieties in hue, value, and chroma (intensity). The four designs at the right show changes in value and chroma without change in hue (they are all in a yellow-red scale). The design at the bottom shows variety chiefly in hue and value. The bowl shows variety chiefly in hue and intensity (the values of the two colors are nearly alike). Harmonies of color exhibit innumerable combinations of these three qualities of color, but they may be classified. Examples of monochromatic harmony, with slight changes in value, are to be seen at page 131, in the cushion designs at the left. The other designs on this plate, the bowl and the rug, exhibit analogous harmonies. The colors are similar in hue. The plate at page 183 shows but slight changes in hue, in its central part, the effect of the whole being a reddish yellow, but has a strongly contrasting border line, a cool color. A similar combination is shown in the plate opposite page 321, where all the colors but the green are less intense. The plate at page 261 shows strongly contrasting colors, some of them (in the hairpin and the pendant), illustrating complementary harmony. Notice that the most intense colors are confined to small areas. The larger an area the duller its color should be. The richest harmonies of color are those which exhibit many hues, values, and intensities of color, but which preserve a general effect, a recognizable predominating hue. These are harmonies in triads. The stencil pattern at page 361 has a yellow-red effect; the circular design at page 261 is a blue thing. In such plates as those facing pages 1 and 305, this most complex form of harmony is seen applied pictorially.

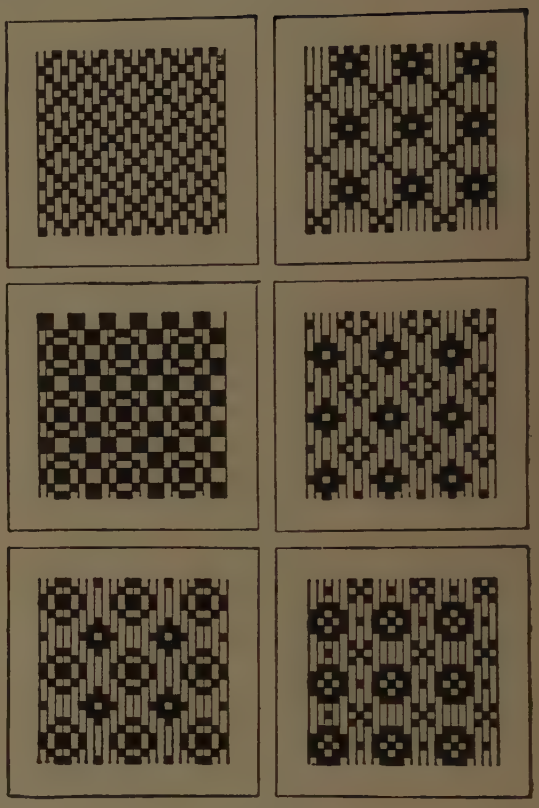
WEAVING

THE PATTERNS OUR GREAT GRANDMOTHERS COULD WEAVE

WEAVING is one of the most venerable of the arts. The Chinese claim records that prove silk weaving to have been practiced in China 2500 B. C. But weaving is much older than that. Its origin is so far back in the childhood of the world that man has forgotten all about it. Some learned people say that weaving was invented in Egypt. In all probability it was invented in at least four different places — by a primitive white man, a primitive yellow man, a primitive red man, and a primitive black man. This early weaving was undoubtedly the simple plaiting of long grass blades or the leaves of reeds and rushes, for mats or for aprons. The paper weaving which is described and illustrated on the next page is the modern form of this oldest of arts. Such weaving was done without a loom. The invention of the simplest loom, such as that still used by the Indians of the southwest, made possible great advances in the art, for along with it, or preceding it, came the discovery of twisting fibers together to form a rude thread. The next advance step was the treadle loom, wherein, by using the feet, the threads of the warp are separated at will. No one seems to know who invented that device. Some say a man in India. After his day there was little improvement in the loom for several thousands of years. Our great grandmothers who wove such patterns as those shown on this page used the old hand and treadle loom, a picture of which may be seen on page 203. Everybody used it, until Dr. Cartwright, an Englishman, "who had never seen a loom in his life," invented the power loom, in 1787. Since his day the power loom has been perfected until it seems almost human, so marvelous are its products. It is gratifying to know that the art of weaving by hand such patterns as are here shown will grow rather than decline with the years. To really appreciate them, however, one must try his own hand at the old art.



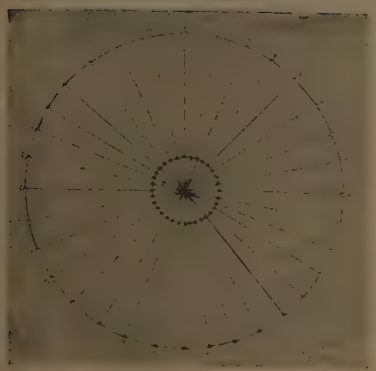
PAPER WEAVING and some of the beautiful combinations possible with the simplest means. The first diagram, 1–2, shows a weaving mat-sheet, by means of which small beginners can produce regular patterns with strips of paper interwoven, and thus prepare themselves for more advanced weaving with the regular textile materials, on hand looms. The children should cut along the ruled line 1–2. Then the top is to be cut along each ruled line, which is done by folding the sheet horizontally, and cutting each line when folded upon itself. Unfold it, and the mat is ready. The lower half provides the strips for weaving. This is the weft, or "filling" as old weavers called it, and the upper half is the warp. Mats usually come in pairs, so that if you want to try this pretty work, buy a gray and a pink pair, or a gray and a blue pair.

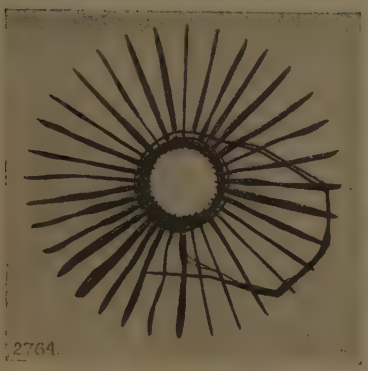


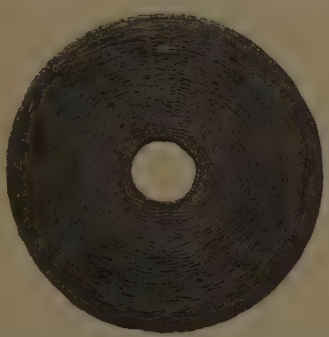
Having these two main sheets, your two woven mats will be, let us say, the one of gray, with pink strips and a gray border, the other of pink, woven with gray strips and having a pink border. You will now be really *doing* a thing in color, and not merely painting a picture of something. The lower part or weft is ruled in strips one-half inch apart with little points between these, one-quarter inch apart. Perhaps you have discovered already that you can yourself rule off as many strips as you wish to use, of any color and of any width. The lowest picture shows some patterns already done. You will see that they look something like the sides of real baskets. On the upper right hand are shown six pretty patterns which you may like to study out.

MAY BASKETS OF WOVEN PAPER. For this, a paper with a tough fabric is desirable, and it will be much more effective if one side is colored, or you can tint it yourself by means of crayons or water colors. In the picture one side is shown before weaving, the other after weaving. The paper should be oblong, folded down the center, and cut into the shape shown, an ellipse with a vaselike base added. About a quarter-inch inside the edge of the ellipse draw a line, A, to indicate the width of the handle and the edge of the basket. Notice the numbers running downward from the top, on lines which should be drawn on the doubled paper, from the fold outward to the edge line, making strips wider at the fold than at the edge. Cut on these lines, from the fold; the number of cuts determines the fine or coarse weave of the basket. Be sure that you number these strips, as it will be much easier to follow the directions for weaving if you do so. The basket shown here is not woven one-and-one, but one-and-three. Start with 1. Skip over three strips, and draw or weave it under 5. Skip three more and weave it under 9; skip three more and weave under 13; three more and weave under 17. Push the strip well over to the edge line. Now take the middle strip of the top group, which is number 3. Pass it over numbers 4, 5, and 6, and under 7; over 8, 9, and 10, and under 11, etc. Next take number 5, and pass it over three strips, and under one. Then number 7 in the same way, and so on till the front half of the basket is finished. The strips which remain loose at the back are then woven in and out in the usual manner. If the work is correctly done, the basket will open without obstruction all the way down to the edge line. The strips are turned towards you in weaving, and each one is brought down through the last available loop, its point spread out and the whole loop drawn out flat, creasing it at the upper ends where it joins on to the border strip. Now you will see why it is better to have one side of the paper colored, for the resulting mesh of woven paper is a system of gracefully radiate lines, curving beautifully from a given point on either side up to the top of the basket. Of what does this sort of basket remind you? If you are so fortunate as to own books of the style of that quaint old series known as the Lucy and Rollo books, you will see a kind of small picture used at the beginning or end of chapters, and known as a head-piece or tail-piece, of which this basket-weave of paper may remind you. It belongs to a time of decorative design which was at its perfection during the period from 1800 to 1840, in which the basket, symbol of fruitfulness and plenty, was a motif often used. In fact, the May basket was itself a favorite with the boys and girls of that period, and the honest fun that comes of making and hanging of May baskets might well take the place of some of our entertainments of to-day. Do not be ashamed of hanging May baskets, even if you are almost or quite in the High School. You will go to bed healthily tired after being chased around two squares; and you will awake refreshed for the day's work.

SQUARED ANIMALS. Notice that it is not "square" animals, but "squared." That is, the form of some animal is in each case taken and changed in its outline. We might well call it translated, which means saying the same thing in a different way, just as we may say "How goes it?" in English, or "Comment va-t-il?" in French, or "Wie geht es?" in German. The same thought is expressed in each case but the form of it is somewhat altered. And so these squared animal forms are not quite like simple drawings of the same animals, done on paper with a drawing pencil, or painted on water color paper in their natural hues. No, these are all done in what we often refer to as black-and-white squares. But black-and-white squares need not affect us as being uninteresting if we build them into lively, moving forms, such as many of these creatures present. The main purpose in view in drawing objects squared is to adapt them to weaving — for representation in articles made on loom, or frame, such as rugs, school bags, raffia and Tilo mats, cross-stitched table covers, and the like. In making animals thus, you must study to have the outlines suggest rather than imitate the contours as they are in nature. For instance, in the curves of a rabbit's back — whatever his position may be — there are several humps or hollows. You will find it impossible to show these. You must make your squared rabbit's shape conform as nearly as may be to the larger and more important masses. Thus does squared drawing help you to see the fundamental parts and essential shapes of an animal. It is best to start with paper that comes squared, but after a while you will be able to rule the paper yourself, and afterwards erase the pencil lines. You can enlarge the drawings to any size by using larger squares. How well the long vertical lines fit the giraffe's legs, or those of the flamingo, while at the same time even the monkey's curved tail is amusingly well expressed. How well the horizontal lines are adapted to the long German dog, the dachshund, or the half-clipped, half-shaggy coat of the black French poodle at the lower left. The squared method also suits the form of the crab. Can you not design in this way a fine lobster? In the lower picture is shown the development of these forms by the cross-stitch, using three shades.







WEAVING — A RAFFIA TABLE MAT AND A DOLL'S TAM-O'-SHANTER CAP. On the mat you can set a hot dish. The cap you can enlarge in scale for your own wear. For the mat: The loom is a square of medium cardboard, with two concentric circles, the inner $1\frac{5}{8}''$, the outer $7\frac{1}{2}''$ in diameter. Divide the outer into 33 points (about $\frac{3}{4}''$ apart), draw the 33 diameters or radii across center. Punch holes where each radius touches either circle. Use plain or colored raffia. Thread a large-eyed worsted needle and sew in the warp threads from beneath, up through an inner hole to an outer hole, then down and up at the next hole and back to the inner circle. Repeat this until the warp is stretched. Weave the woof over and under, from the center, until the circle is filled out to the circumference. Upon the back of the mat pass a thread underneath the two circles, catching the threads in order that they may not slip off when the card is trimmed for use. Cut away cardboard around the outside, and trim out center. Whip inner and outer edges with a raffia border, over and over. Glue on a heavy paper disc underneath as a finish.

The tam-o'-shanter hat is woven in much the same manner. The inner circle is larger in proportion to the outer circle than that of the raffia mat, for it is to be the headband of the cap. After measuring the head, take one sixth of that measurement for the radius of the inner circle. For the outer circles use a radius about one and one half times that of the inner circle. Divide the circles by points made about half an inch apart, and draw the radial lines as in the raffia work. These parts must be an odd number. For a trial, take a six-inch square of cardboard, find its center, and draw a two-inch circle, and from the same center, as large a circle as the card will contain. Punch small holes as before. Use about three yards of double Germantown yarn, and darning needle No. 2.

Begin warping in the quarter of your circle where the last and odd-numbered hole came.

Method of Working.
Figure 2.

Buttonhole Stitch.
Fig. 1.

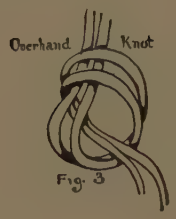


Fig. 3

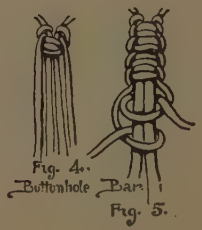


Fig. 4.
Buttonhole Bar.

Fig. 5.

Detail of Fringe
Fig. 7.

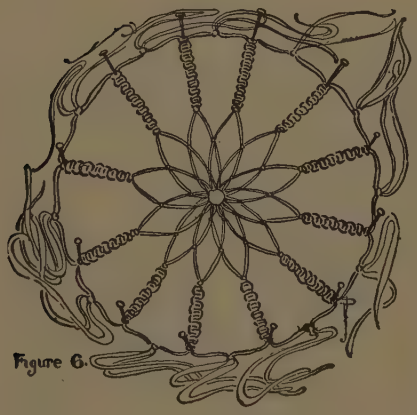


Figure 6.

A Knotted Bag of Raffia

A KNOTTED BAG. Made of either raffia or soutache braid. The center, the little circle in Fig. 6, is 1″ in diameter. Twelve pieces of the material are cut, each one yard long, and looped on to the circle by the stitch, Fig. 1. You will find it easier to pull the knots tight by hanging the work to a chair by a string, Fig. 2. Knot each strand to its next neighbor by an overhand knot 1″ from the center circle. Make a second row 1¼″ outside the first, and a third row 1½″ outside the second. Keep each circle even. The twisted-looking bars are made by laying out each pair of strands like a spoke, and looping on to the outermost knot 12 new strands each 12″ long, folded in half and fastened to the knot by the buttonhole loop, Fig. 4. Loop about the pair of foundation strands each of the new strands successively, using the buttonhole loop or two half-hitches, first with one and then the other. It is well to hold the foundation strands first with one hand, then reversed. See Fig. 5.

Draw tight and push each hitch firmly against the last. Make thus eleven hitches with each hand. Over the ends of the two new strands tie with the two foundation ends an overhand knot (see Fig. 3) and cut off the ends of the two new strands. The end may be covered with a few stitches of silk, of the color of the material. Then pin down the work on a board or cardboard, as in Fig. 6, connect each of the twisted bars by tying one strand of the loose ends of each, as shown, and thus form the first row of a new series of knots in a circle, as you did for the bottom of the bag. Add three more such circles of overhand knots, allowing each circle to grow a little smaller, for the tapering of the work at the top of the bag. There will remain about 1½″ of the ends to start a fringe with. Cut two pieces of material each 32″ long, for drawstrings. Fold the piece of braid that is left into thirds, then halves, again into halves, and cut the loops. Cut each resulting piece into halves, and attach with the buttonhole stitch to either side of each overhand knot on the outermost circle. The bag should be lined with a piece of plain silk, of a color to harmonize with the braid used, and two inches deeper than the knotting. Make a one-inch hem at the top, and gather the bottom. When in place, sew each of the knots round the top of the bag to the hem. Place a few stitches at the bottom to keep the lining and knotting together. Run the drawstrings through the top meshes.

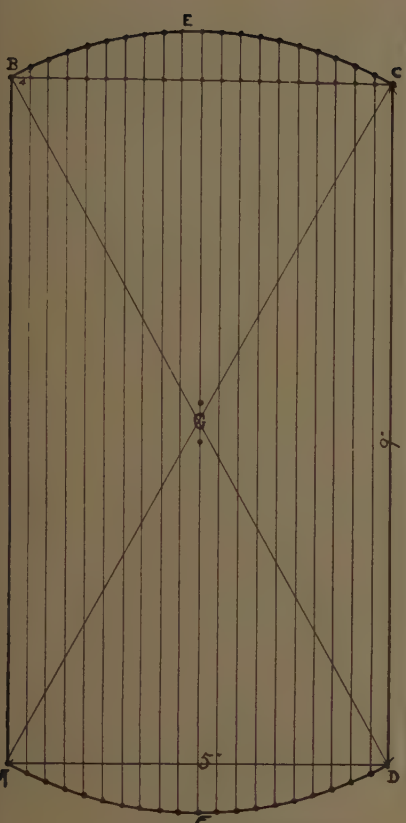
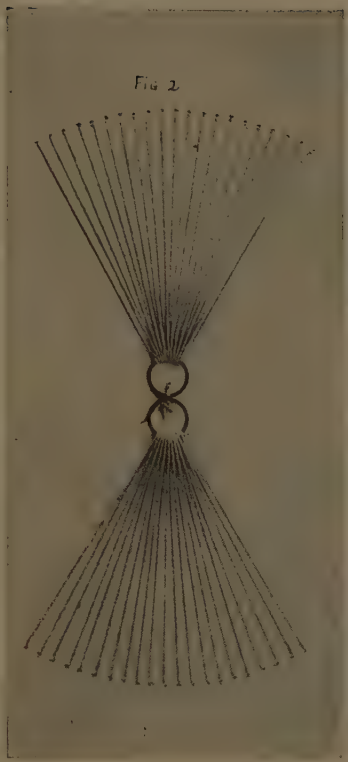
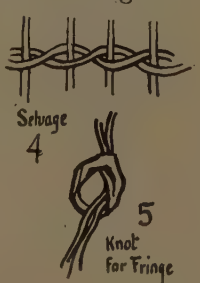


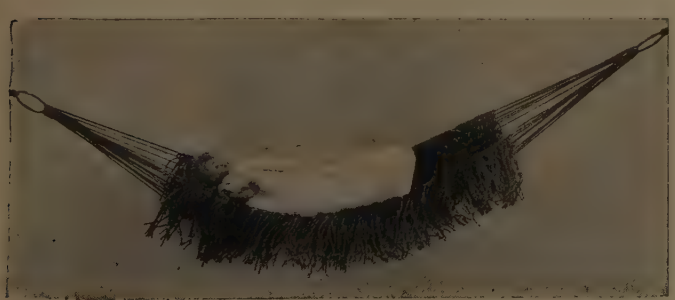
FIG. 1.—LOOM FOR HAMMOCK

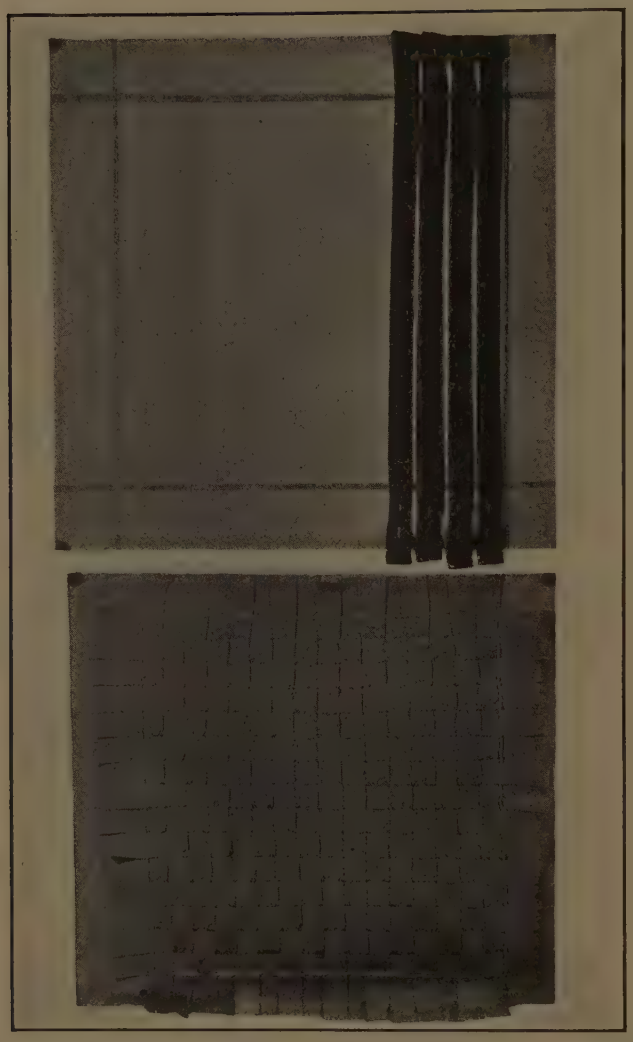


A HAMMOCK FOR A DOLL. The loom is made of a piece of strawboard, 12″ × 6″, laid out in an oblong 5″ × 9″ as in Fig. 1. Find the center G by drawing the diagonals, and strike the arcs B–E–C and A–F–D from G. The lines are ½″ apart, and a hole is punched at both ends of each, on the arcs. Two other holes are made, each ¼″ from the center, for the rings. To make the hammock, start from top ring, carry the warp thread to B, through to the back, down to A, up through A to the other ring, then repeat to each line in succession as shown in Fig. 2. The rings are tied together. To weave, wind to weft the long way around the loom, cut one end of the loops, and weave over and under, the loose ends answering for fringe. Protect each end with a selvage as shown. Use a ruler for a "heddle" to keep the warp spread for each "shot" of the needle. "Beat up" each shot by crowding with the ruler. Tie the fringe as at 5, cut the rings free and tear away the loom. Two brass rings and floss for weaving and a tape needle are the materials.



If you are ambitious, this doll's hammock will furnish you with the ideas necessary for weaving a hammock strong enough for the baby.

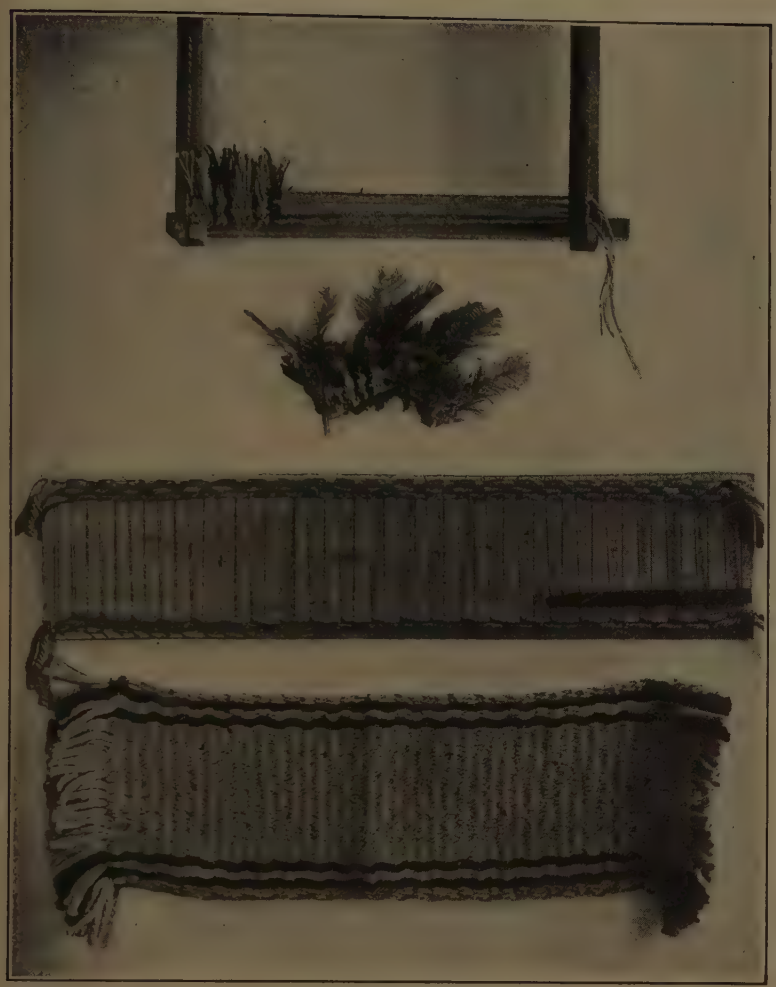




A TABLE MAT. This is made of strips of outing flannel, and is excellent work for little folks who love to make "truly" things. Braid, either Angora or Merzo, can be used instead of flannel. The strips should be about 1″ wide. Choose one color for warp and another for weft. Cut these strips into 12″ lengths, eight of each color. Pin the eight warp strips down upon a sheet of heavy paper 12″ square, with a line ruled 2″ in from each side. This allows for fringe. Place the first strip along the inside of one of the border lines, and the others closely parallel to it. Weave the eight strips of contrasting color through this warp, one at a time, until the space is filled and all the weft has been used. Finish with a coarse running stitch around the sides to hold the strips in place. Use a darning needle and cord or luster thread of a suitable color for this purpose. Remove the pins. When using a paper loom, any size mat may be planned. Rectangular forms of other dimensions and proportions can be made as well as squares.

After having made one or two good rugs in the two simple colors, it will be well to try one with a border. For the twelve inch square size, only two strips can be well spared for the border. For the simplest border effect, have all the strips but the border strips, both the warp and weft, of one color, say of dark blue, and with a yellow border of a soft tone the result will be a prettily checkered effect along the border stripes. A plaid effect might be obtained by using a strip of the other color every three or four strips each way, both in the warp and weft. In fact, in rugs done in this way in larger sizes there is practically no limit to the beauty and variety of the results. One fascinating way is to take a plaid fabric, like a steamer rug or a shawl — better still if you can get a genuine Scottish plaid — and try and work out in your simple rug weaving the main color combinations of the plaid. In the older days of the Scottish Highland clans, when each clan was known by two prominent marks, the pattern of its plaid, or *tartan*, and the particular sprig of tree or plant that was worn pinned to the bonnet, the ancient craft of weaving was but one of many practiced by the women of the clans. The colors were made from genuine vegetable dyes that were fast of color, and the yarn of which the cloths were made was honestly spun and well woven. The patterns of the tartan were learned by heart, even to the last thread, and handed down from mother to daughter. The weaving was complicated, but in principle it was just like these mats.

Like the butterfly among insects or the tiger among quadrupeds, the plaid is unique in color among the fabrics woven by man.



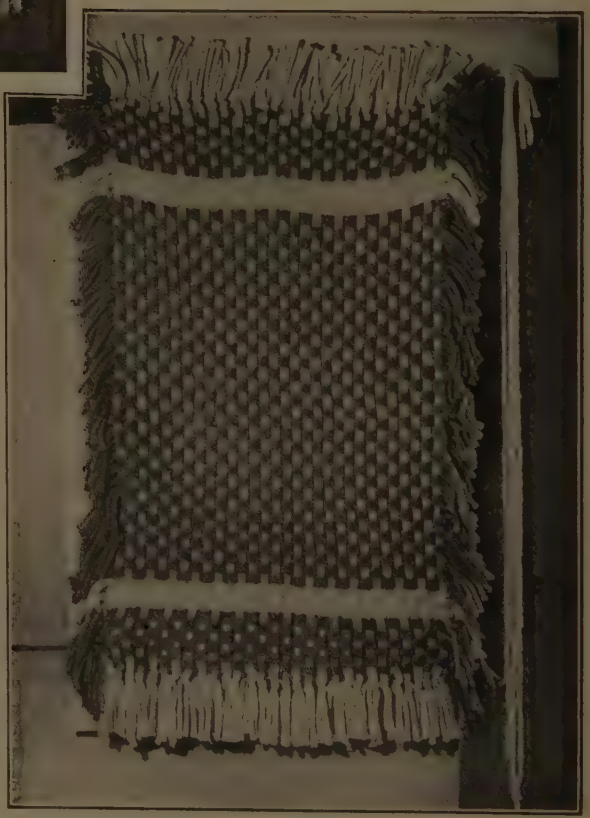
Weaving an Indian headdress and blanket. Both require the use of a very long warp and very short weft or filling. A wooden needle is also required. For materials, get some roving or jute yarn, strong cord or carpet warp, some nails and small pieces of board or a wooden box, and chicken or turkey feathers. The picture shows: Uppermost, a loom for the Indian headpiece, 12″ × 12″; below it, the headpiece with the feathers; next below, loom for Indian blanket, 5″ × 15″; and lowest, the blanket. For the blanket loom use a board a little larger than a shingle, 6″ × 18″. Place nails for the warp about ½″ apart along the two long sides. Use strong cord, and warp from nail to nail, tying to the first and last nail. Allow 10″ of warp at each end for the finishing off. Cut the weft in strips of the proper length, measuring the full length of the loom plus the allowance of 2″ for fringe at each end. The needle is a strip of wood of the required length, whittled to a point and having a notch to hold the thread. Place first the two weft strips for the selvage, then weave the body in the usual manner, over and under the warp threads. Weave towards the center until the warp is covered. In joining work when a new thread is needed, lap the weft about one inch, taking care to put the new piece under and over the same set of threads as the old. Finish off the blanket by buttonholing the unfinished ends with the ten-inch piece of the warp cord that was kept for this purpose. Trim the fringe and remove the blanket from the loom.

For making the Indian headpiece almost any individual school loom can be used, also a strip of wood or of strawboard. Place four continuous warp cords about ½″ apart and of any desired length. Cut the jute yarn or roving into 6″ lengths. Weave through the warp, coming back to the starting point, thus forming a selvage on one side and a fringe on the other. Continue to weave until the headband, about two inches wide, is completed. Remove it from the loom; sew the ends together to form a circle, and insert the quills of the feathers into the woven band. By weaving a much longer piece, and allowing one end to hang down the back, a "war bonnet" is made. Try and secure large, long and straight feathers. In a real Indian's bonnet, each feather meant something. It was varied in shape, its tip was sometimes dyed, and sundry nicks in the plume had also their meaning.

A CHILD'S PRACTICAL BATH RUG AND A DOLL'S MUFF AND TIPPET SET. THE MUFF: The warp and weft are both continuous, so as to form a selvage. Materials: White roving and white warp cord; looms of wood or strawboard. Cut two-yard lengths of the roving or the warp. About 12″ from one end of the warp place a knot and use this to hold the warp in its place behind the first notch of the loom. Continue to warp until there are seven rows. Tie the two ends of the warp together at the back of the loom. These ends furnish the neck cord of the muff. Weave the weft continuously, forming a selvage. Use pieces about 1½ yards long for the weaving. When a new strand is needed, lap over the old strand 1½″. A temporary knot at the beginning of the weft thread will prevent raveling. After the weaving, remove from the loom. Draw up the ends of the warp, gathering the sides of the muff into the desired shape. Join the muff by carrying each end of the warp across to the opposite side. To form a neck cord, tie these ends into a bowknot.

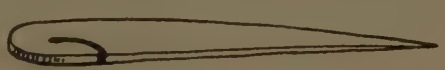
THE TIPPET: Use a loom of any width and about 12″ long. A strip of strawboard notched at the short ends (¼″ spacing) will do. For warp, use 7 feet of cord. For weft, white roving. Tie an end of warp to the first notch or nail, and pass the thread through each notch, forming 7 warp threads ¼″ apart. Tie warp to last notch. Loose ends left after warping can be covered in weaving. Fix the taper by drawing warp threads somewhat together in the middle with a string. Weave from ends in towards center. Cut short lengths of roving for fringes, drawn through end loops of warp.

THE BATH RUG: Cut warp and weft in lengths. It measures 12″ x 24″, and is woven with four strands to the cord, both warp and weft. Cut 8″ longer to allow for fringe of 4″ at each end. Knot warps 4″ from each end, and stretch over warp pins, as shown at right.



A MARBLE BAG AND A BOY'S MUFFLER. THE BAG: For this is required roving for the fabric, and the short side of a chalk box for a loom. Make the needle out of a thin strip of wood, like a paper knife, taper one edge down to a point at one end, round the other end for a head, and a short distance from this end on one edge cut a notch in which to catch the thread as shown in the small picture. Cut a three-and-one-half-yard length or 126″, for the warp. Place a temporary knot in one end of the roving and use this knot as a beginning for the warp. Warp to have one end of the bag open and one closed. Beginning with the knot at the top of the loom, carry the warp down under the opposite notch, and up on the under side of the loom to the starting point. Carry the thread across to the next notch, and continue to warp in the same way, until all the notches have been filled. Fasten off the thread at the last notch and begin to weave all the way around. The warping for this exercise should be rather loose, as in the case of the toboggan cap. After each round of weaving it will be necessary to cover two threads in order to produce the proper arrangement of the overs and unders. The same rule applies here as in weaving a basket having an even number of spokes. After the bag has been removed from the loom, use two 12″ lengths of roving to draw it together at the top. It may be used for a bean bag if desired, in which case sew the open end securely after filling, and omit the strings. A pan-lifter or any kind of a kitchen holder can be made in the same way, if a larger loom is used. Two colors of roving, one for warp and one for weft, make an attractive checkered pattern for the bag.

THE BOY'S MUFFLER. For materials there are needed: A strip of board 18″ long by 5″ wide, small nails for holding the warp, stout cord, and roving. To weave, employ the method described for making the doll's tippet. (See "A Child's Practical Bath Rug and a Doll's Muff and Tippet Set" on page 192.) This is made in the same way except that it is finished without fringe, and is larger. It could be made more attractive by introducing stripes for borders at the ends, which could be done by using another color of weft for the distance required for the width of the stripe. This muffler must not be taken as a plea for tying thick things about a healthy throat, for that is a practice of doubtful wisdom. It is probable that the throat weakness that often bothered the New Englander of the middle nineteenth century was owing to this tendency to swaddle the neck in thick woolen things like "scarfs," "chinchillas," and even the ridiculous "clouds." Away with them! Let the free, dry air of our upland winters have full tilt at any properly exposed part of our bodies. But there are times when a neatly fitting, compact muffler is as necessary as rubbers or a jersey; as when recovery from a cold or a longer illness has brought out the doctor's order to "get into the open air, but wrap up well!" Then it is that such a muffler, well made and attractive, is just the thing.

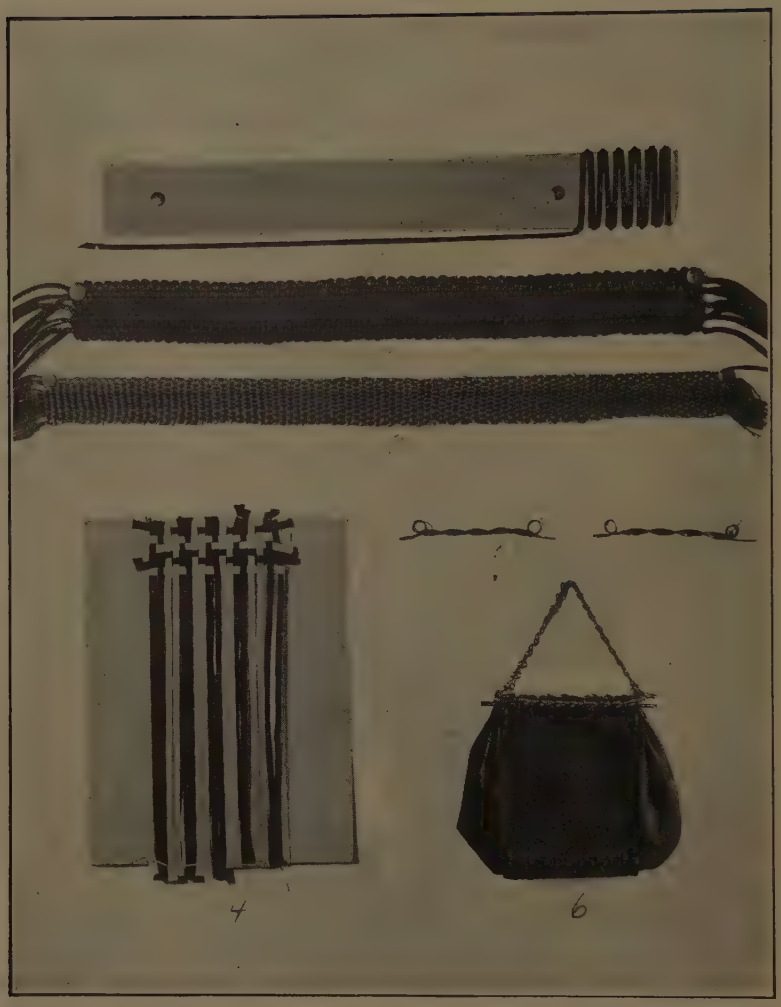


A DOLL'S HOOD AND A TOBOGGAN CAP. The loom for the hood is shown at the top. That for the toque, or toboggan cap, is seen at the lower left, narrower at the top than at the bottom. The hood loom is as long as the measurement around the face of the doll or child. Make the width a little more than one-quarter the length. Cut the strawboard for loom according to these lengths. Notch the loom on the long sides ¼″ apart. Warp the yarn as usual, fastening the end at the last notch. The three weft threads next the face side should be left long to serve as tie strings, and may be braided. If of a different color, these may also serve as a border. Cut them three times the length of the loom. Do the rest of the weaving with a continuous thread to form a selvage on the short sides. Remove the loom, and join the short ends at the back, leaving thus a circular opening. Fill this in with an odd number of spoke-warps, and from the center weave out towards the hood proper, until the back of the hood is thus filled. This weaving will be done more easily over a ball.

Three finished hoods are shown. To make the TOBOGGAN CAP, the loom for a doll's size should be 4½″ square, tapered at the top to 2¼″. Make 9 notches at each end, as shown. It will be easiest to make the center notch first. Cardboard or strawboard will answer for the loom. Use yarn for both warp and weft. Place a temporary knot in one end of the roving-yarn, as a beginning in placing the warp. Warp to have one end of cap open and one closed when finished. Beginning with knot at bottom of loom, carry to opposite upper notch, back down on under side to same notch again, then cross to next notch, up front again, and down back, and so on. Keep warp rather loose. In order to make an odd number of threads, one extra notch may be placed at the lower end, and the 10″ length of warp carried to the top on one side only. With the yarn that is left, begin to weave at the top. After removing from the loom, thread the needle with yarn and draw the top together. Fasten securely and use the yarn remaining for holding the tassel.

A GIRL'S HAND BAG AND A BOY'S DICKEY OR COLLAR PROTECTOR. Materials required for the bag are cardboard for the loom, two brass rings ½″ in diameter, some yarn and luster thread, any suitable material for lining the bag, and a chenille or darning needle. Draw a 6″ circle and its horizontal diameter. From each end measure up one inch and draw two radii to the center. Below these radii will be the loom. Cut this part out and place notches along the circumference ½″ apart, for the warping. At the center of the circle, on each side of the loom, baste a brass ring in place for holding the warp threads. Use yarn for warping. Begin with a three-yard length. When a new warp is needed, fasten to first piece at circumference of loom. In beginning to warp tie the yarn to one ring, pass out to one notch and along underside of loom, to the other ring. Repeat back through next notch to first ring. The last warp thread will end at a ring. Weave on one side at a time, with the result of an open top. Do not draw the threads very tight or the work will "pull in." Dainty Roman stripes may be introduced by using small quantities of luster thread to form the semi-circular bands of color. When the weaving is done, cover what has been left exposed of the brass rings with yarn, using a buttonhole or blanket stitch, and remove the woven piece from the loom. Place within it a bag made of soisette, silkolene or sateen, made as follows: Cut the cloth 8″ x 18″. Fold over and join the two 9″ sides to within 3″ of the top. Turn down these 3″ to form a hem. Place a half-inch casing to hold ribbon and draw the bag together. Sew the silk to the woven part. Umbrella coverings make good material for the inner bag.

THE DICKEY. The loom is similar to that for the toboggan cap. The materials, warp cord and weft yarn. Three sides of the loom measure 8″, the fourth 6″. There are usually sixteen notches, and the warping is done on one side only. The weave is of the ordinary sort. The collar part is made on the long, narrow loom, and sewed to the lower or breast part. The spaces are ½″ apart. Finish at the back with two buttons and loops, or with tailor's hooks. All three looms are shown in the picture, strung with the warps.

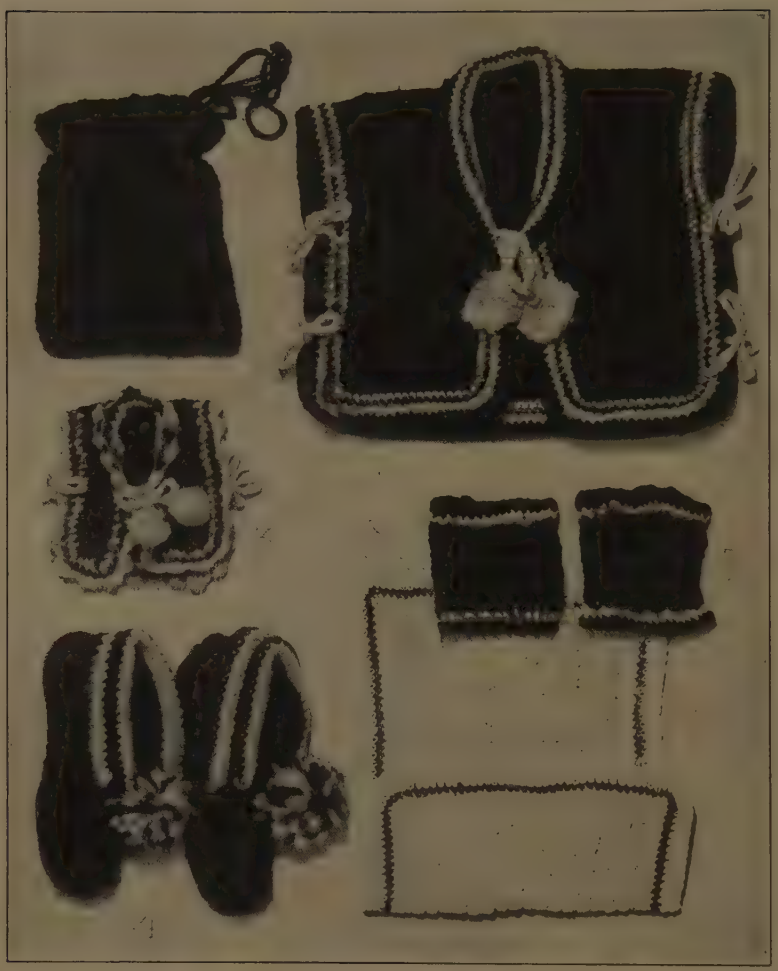


A BELT OF WOVEN BRAID AND A BAG OF THE SAME WITH SILK EXTENSION. The cardboard loom for the belt is shown at the top of the page, and two finished belts are shown below it, the upper one being of shoestrings — of either web, round, or leather strings — and the lower of braid. At the lower left hand is the cardboard loom for the bag, and the bag itself is shown. Above the bag are the two extenders of Venetian ironwork. Materials for belt: Loom 20″ x 2″, No. 29 worsted braid, large needle, pins and thread. Warp as shown, weave inward from each edge, and to prevent "drawing in" of the weave, catch down the warp ends held by the pins, also at the loose ends of the belt. A few stripes of another color add interest. The bag loom is 12″ x 5″. Weft strips are 7″ each. Two colors may be used. Before removing, slip a crinoline lining between loom and web. Turn in extra weft and catch to this. Silk lining is cut 1½″ wider each side and stitched in. Fold bag and sew up sides to within 3″ of top. Insert extenders and hang with chain or cords.

A HOME-MADE LOOM AND ITS WEAVING. The lower picture shows how two parts of a school chalk box can be used to stretch a warp very handily. From 1 to 4 are shown: the loom, the loom warped, and a doll's rug started and completed.

Suggestions for further work in woven articles. The first one, at the upper left hand, is a purse woven of luster thread. This material, strong and durable, yet very beautiful in the results obtainable with it, has a glossy surface, appropriate to a purse such as that shown. Metal tops can be purchased, sometimes at the famous "five-and-ten-cent" stores, for sewing on to such a purse. The method of weaving is the same as that for the marble bag. The colors used for this purse were tan and brown. The middle article in this row is a local telephone directory case, indispensable when the telephone in the home is much used. This neat cover is made of gray linen with the design woven into the cloth from underneath. The right-hand and last article in this row is a purse made of black luster thread. This is woven in the same shape as the tam-o'-shanter, but is fastened to a circular top, which comes ready-made with a hinged lid that snaps down.

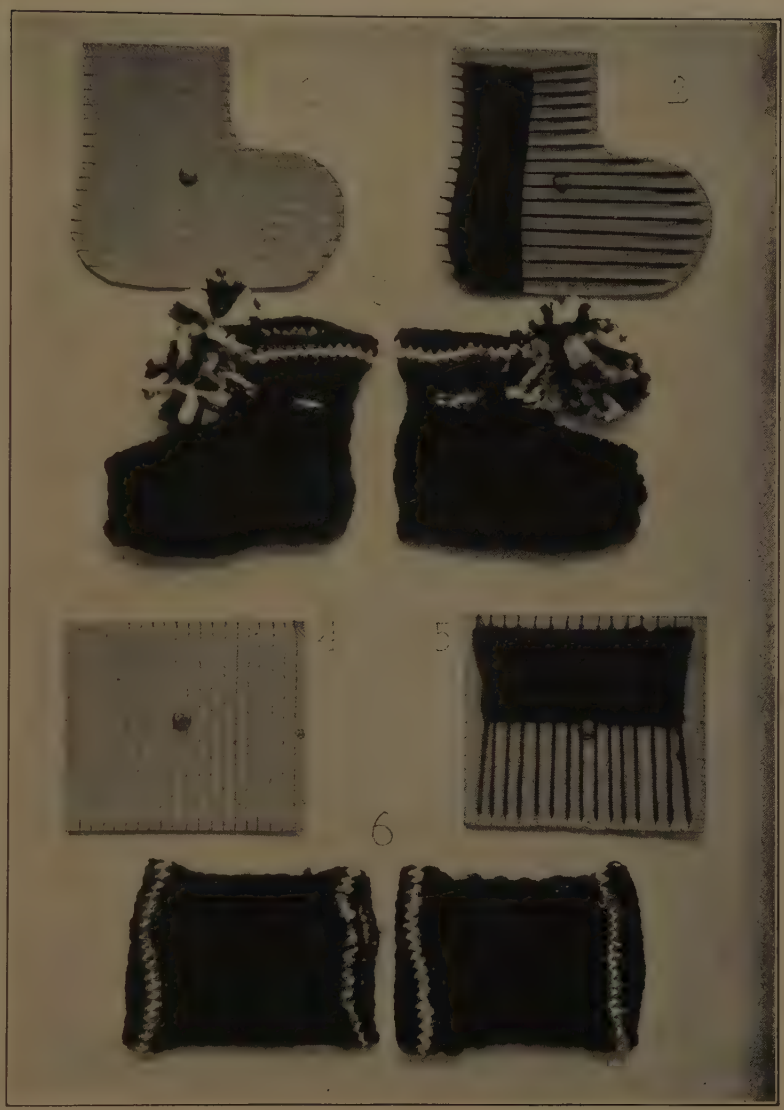
This particular purse is ornamented with steel beads. Woven ornament is by far the more workmanlike, demanding as it does somewhat of the real skill of an experienced weaver. The middle article in the second line is a purse woven of stout yarn, this one being olive-green with dashes of color. This is woven in the same way as the marble bag, but has bent iron extenders. The remaining five squares are studies of patterns of various weaves done with a No. 29 braid. From these the student of weaving may get valuable hints for individual work. In the upper left-hand and lower middle patterns are suggestions of the work of the American Indian of the southwest in his decoration of wearing apparel. His principal garments, indeed, are still woven after the simple methods shown in these examples, and in the moccasin decorations of the more northerly tribes, whose principal garments were not woven but cut from skins, the exquisite bead work employs again and again the simple square and triangle in endless variations. The traveler in the southwestern United States may see at the present time the simple hand loom, usually vertical, in daily operation, among the Navajos, Zuñis, or Yaquis, and articles for use and of great beauty being woven on exactly the same principles that govern the making of the simple things here shown.



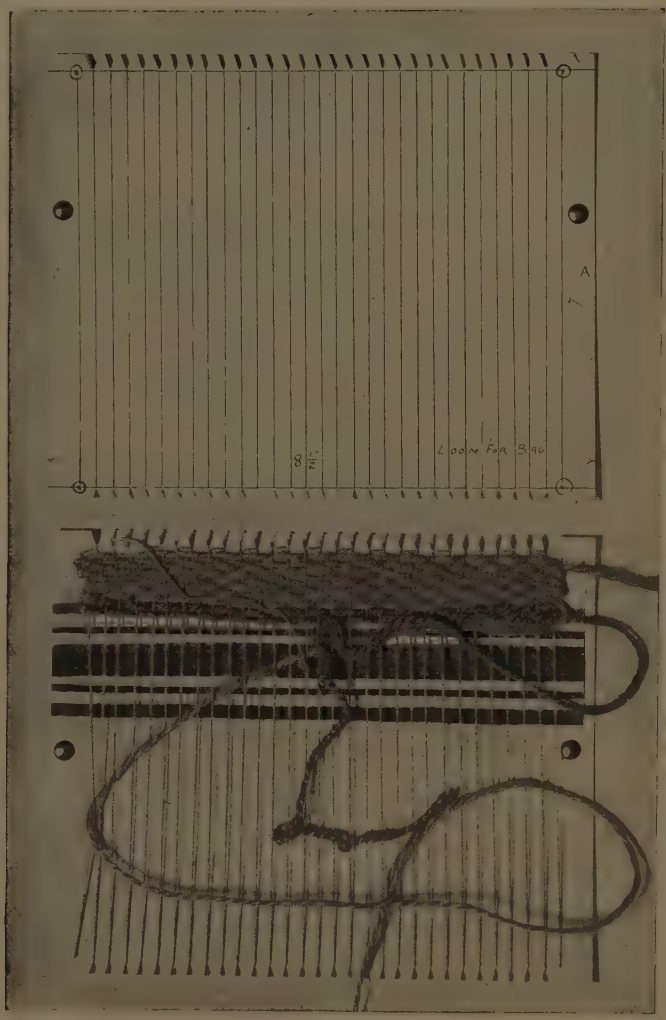
USEFUL THINGS MADE IN CROCHET. Crocheting is akin to weaving. The five different things shown here include the little coat for babies (also a doll's size) called a comforter, a yarn bag, bedroom slippers, wristers and a washcloth. The chain stitch is the foundation of all crocheting. Make a loop on the needle; pull another loop through it, and repeat until you have the length desired. Each loop is called a chain. For single crochet insert the hook in a loop of the chain, draw the yarn through, pass the yarn around the hook, and draw it through both loops on the hook. For double crochet pass the yarn around the hook, insert the hook in one loop of the chain; draw the yarn through, pass the yarn around the hook, and draw it through two loops; pass the yarn around the hook and draw it again through two loops.

To crochet the COMFORTER. Make a chain of 45 stitches, take up each chain with a single crochet stitch. Second row: Turn and single crochet stitch, taking up the back stitch to form the rib or slipper stitch; crochet back and forth in this way until you have 25 ribs, which form the back. Take up 17 stitches, and crochet back and forth on this till you have 25 ribs, or one side of the front. Count off 10 stitches for the neck, taking up the remaining 17 stitches for the other side of the front and make 25 ribs. Finish with a border all around of single crochet, taking up the whole stitch until you have eight rows. Finish the whole garment with a picot. To make the picot crochet an edge all around as follows: Fasten the yarn with a single crochet stitch (1), skip two stitches, make a shell of five single crochet stitches, and fasten; skip two stitches, make one single crochet stitch in the next stitch. Repeat from 1 until completed. Germantown yarn, three skeins, and a No. 1 crochet hook are required.

To make the little ornamental balls seen on the comforter, hold two fingers about 1½″ apart, and wrap yarn around them fifteen times. With yarn ends tie a tight knot in the middle of the loop and thus form a bowknot; clip both ends of the bowknot and shake yarn ends until they fall together. With scissors trim the yarn ends into the shape of the ball. A large ball is made by barely clipping yarn ends into the ball shape: a small ball by clipping the ends closely.



CHILD'S BEDROOM SLIPPERS. For these but two skeins of Germantown will be needed, the same crochet hook will answer, but a pair of slipper soles must be bought, of size 7. To crochet first row: With yarn make a chain of 10 stitches, which will allow one stitch for turning, then crochet four stitches, and increase two extra stitches in the fifth stitch, crochet four stitches, one chain, and turn. Second row: Crochet across (taking the stitch or loop from the back, this makes the rib), without increasing; you will then have formed one rib of vamp. Continue ribs for vamp until you have 10, increasing two stitches in the center of each rib. For Side: Crochet 14 single crochet, chain one and turn, work back and forth on these 14 single crochet until there are 18 ribs around, join on the wrong side, taking up the back stitch of the side and vamp; this will make a neat joining and will not show on the outside. Top: Crochet all around top of slipper one single crochet stitch on every and between every rib. With yarn crochet around and back until you have a strip for turn-over around the top. Finish with a ribbon bow or crocheted chain and ball. For the WASHCLOTH use one ball fourfold tidy cotton, steel crochet hook No. 2. Make chain of 45 stitches, taking up each chain with a single crochet stitch. Turn and single crochet stitch, taking up the back stitch to form the rib. Crochet back and forth in this until you have 25 ribs; now single crochet all around to form the border and finish with a loop of 12 chains by which the cloth may be hung. The TWINE BAG: Use one ball of twine. Steel crochet hook No. 1. First row: Make a chain of 40 or more stitches and join the two ends. Second row: Single crochet stitch in each loop of chain. Third row: Single crochet all around, taking up the whole chain. Continue making rows of single crochet just like the third row until you have the bag as long as you want. Chain two and skip two stitches of the previous row. Continue from the first until around the top of the bag; join to the first chain in the row and then



finish the top with picot. For the WRISTER: Germantown yarn, one skein; steel crochet hook No. 1. Make a chain of 30 stitches, turn and single crochet back and forth, taking up the back loop of the chain to form the ribs. Continue until you have the desired length. Join the sides to form the wrister. Finish the ends with a crocheted edge. The second illustration shows woven bootees and wristers, which are self-explaining to one who has had experience.

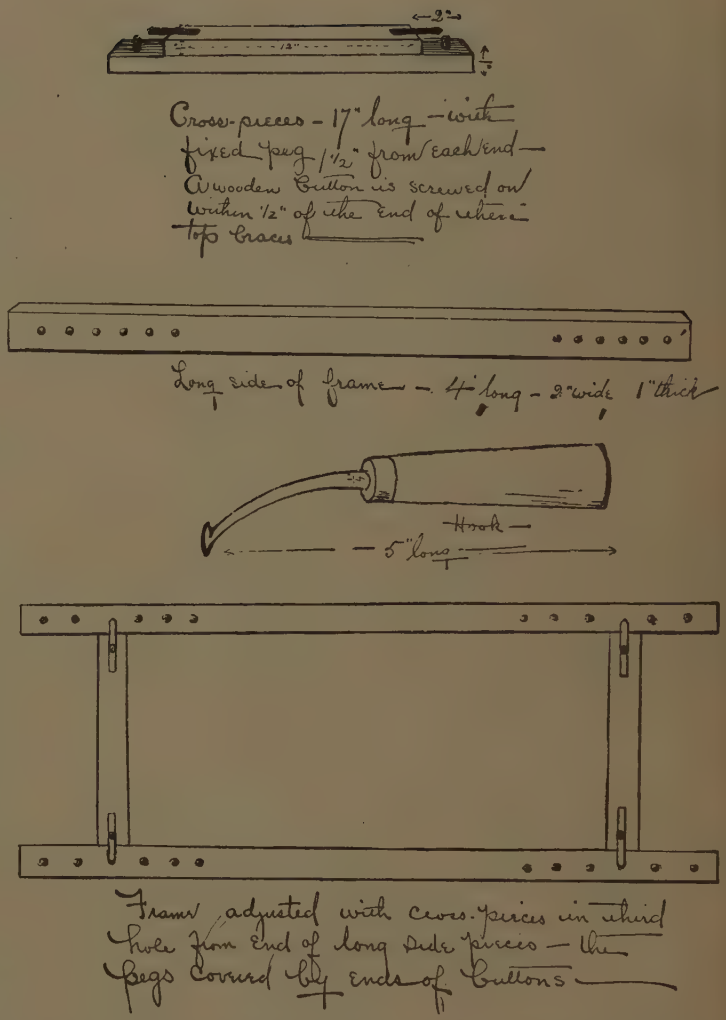
A WOVEN BAG AND A BAG OF ART BURLAP WITH A DARNED-IN PATTERN. This bag is made in the same general way as the toy hammock. The loom for the bag which is pictured was 8½″ × 7″, but any size may be made. It may be of cardboard or strawboard, and is notched, not pierced. The lines for the notches are started ½″ in from the shorter sides, and are ¼″ apart. To be sure of having the notches of an even depth, draw a line ¼″ in from each long side, and cut the notches even to this line. Cut none on the first and last lines on the short sides, as these must be pierced at the ends for the hat pins which are inserted through the loom to keep the edges of the weaving even. To string the loom, carpet warp either white or gray is passed through the first holes at the top and bottom of the card, then through the first notch, way around the loom, back through the first notch and then over to the second notch; around the loom, back through the second notch, over to third notch, and so on to the last hole, through which it is threaded.

Both sides of the bag are strung at once, insuring sides of equal length and breadth. After the pattern for the stripes has been inserted under the warp, as shown, threads and hat pins passed through the holes at each end, the weaving is done, using as long a thread as is convenient, and weaving closely. The weaving is the simple over-and-under, alternating. The material is two-ply jute wrapping cord, and this can be bought only in the natural color. For the threads which make the colored stripes, the cord must be dyed. This can be done at small expense. Remember that your school ruler is a handy thing with which to separate and raise one set of warp threads at a time, for your needle to pass under. Either the wooden needle described on page 193 or a darning needle will answer. After the bag is woven down on one side, the weft thread is carried over through the hole at the bottom to the other side, the hat pins replaced on that side, and the other side of the bag woven from the bottom upward.

The work is in one piece, easily taken off the loom when finished, and the sides sewed up, "buttonholed" or "over-and-overed" with some of the carpet warp. The handles are made by braiding three strands of the jute together and tying a knot in the end of each braid. They are sewed to the bag through the knot. This jute bag is shown completed at the top of the group in the illustration on this page. It is at once a good piece of handicraft and a very strong and durable article.

The two DARNED-IN BAGS are of burlap with threads drawn out and a pattern darned or woven in, the pattern material being a single-ply jute either natural or dyed. The bag is of Art burlap, either colored or plain. The pattern must be previously designed and worked out upon squared paper, which will serve as a handy copy for working it into the burlap. Cut the burlap in a strip $24\frac{1}{2}''$ long, across the material, and $9''$ long lengthwise of the material. A tape needle is handiest for the darning-in or weaving. In these two examples the simple square is again the motif, and the pattern is made up by repeating it in pleasing groups. When the darning-in is completed, the ends should be fringed two inches, and turned over on to the right side of the bag to a depth of $1\frac{3}{4}''$ or more, and the edges of the turnover and fringe cross-stitched or not, as you choose. The sides are then sewed together by back-stitches on the wrong side and the bag is then turned. The handles are braided of jute. This will require six strands of the single jute for the three-strand braid. The particular bag shown in the picture measures $9'' \times 8\frac{1}{2}''$ with a turned-down edge of $3\frac{3}{4}''$, which includes the $2''$ fringe. Burlap may seem to you, at first thought, to be a coarse, cheap-appearing material; this may be on account of its having been used for packing purposes for so long a time, before it was discovered as a material of beauty. But it strongly suggests some of the very ancient linens of the coarser weaves, examples of which, very rare, are among the treasured belongings of the great art museums. To see a fabric of this nature, two thousand years old, is to look suddenly as it were into the buried past.

A HOOKED-IN RUG AND INDIAN BEAD WORK. If you make a really good hooked-in rug, it will compare well with the Indian or Oriental work. All three will be equally honest and serviceable, if not equally beautiful. The rug-frame is plainly shown in the picture. The rug is hooked through a burlap foundation. The pattern is cut in a strong paper stencil, and when you have tacked the stencil and burlap to a table or board, it is scrubbed in with bluing applied with a nail brush. Tack and evenly stretch the stenciled burlap to the frame, and cut the flannel for working the rug into 9″ pieces. Polish off all sharp corners of the hook. When ready, pass the hook down through the burlap and draw up one end of the strip. Hook again, about two stitches away, and pull through a loop, ⅜″. Loop the entire strip and take another. Do the design before you do the ground. Shear off the tops to a velvety smoothness. The rug must be hooked in sections, as the frame will not hold it all at once. Never let an end hang down, always pull it through. You can use old flannel provided you have enough for covering a good design, but new flannel is not very expensive. Such a rug will last a lifetime, perhaps longer. Geometric patterns, such as the Indians made, are most satisfactory in the long run.

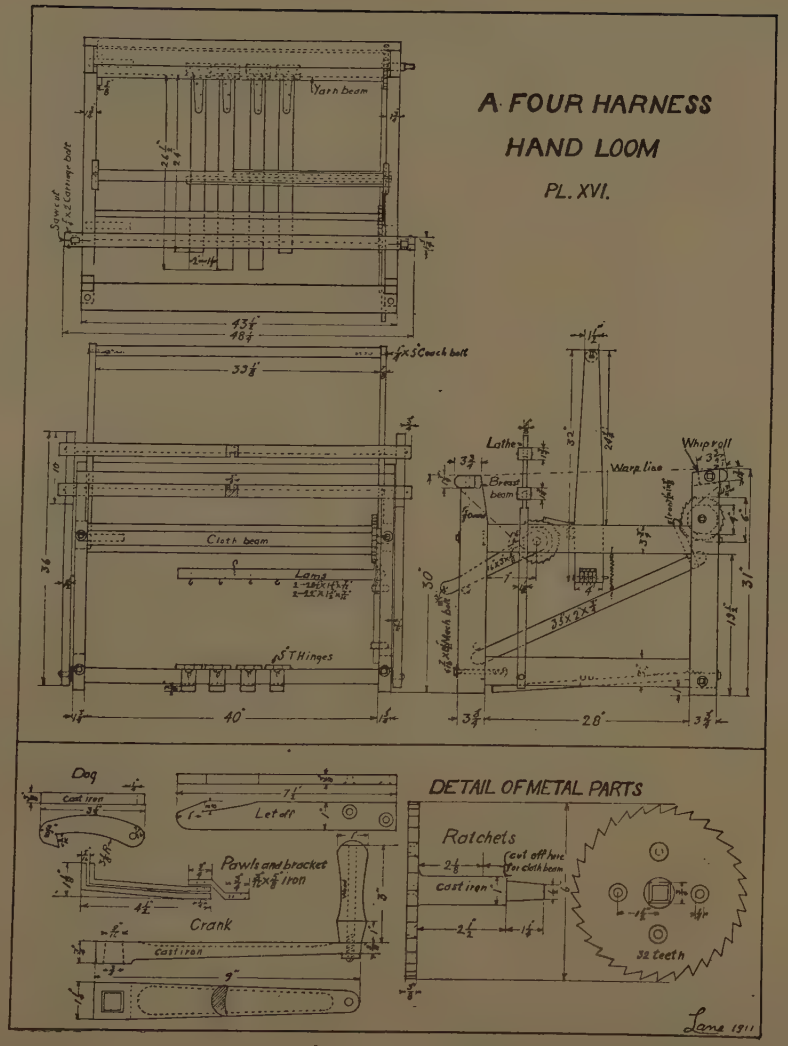

2"
Cross-pieces - 17" long - with fixed pegs 1½" from each end - A wooden Button is screwed on within ½" of the end of these top Bars
Long side of frame - 4' long - 2" wide 1" thick
Hook
5" long
Frame adjusted with cross-pieces in third hole from end of long side pieces - the pegs covered by ends of Buttons

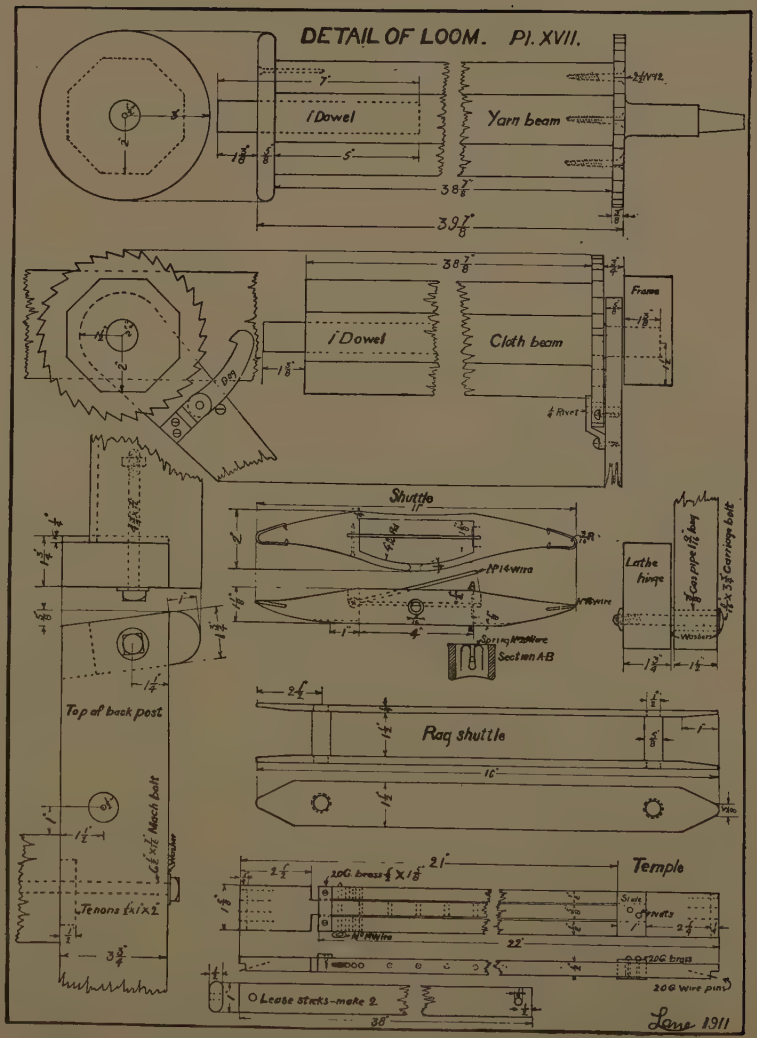
A LITTLE BEAD-BELT LOOM. This is strung like the bag looms and others. Agate and Size E beads are good for beginners. Colors are usually limited to three. No. 40 gray linen is best for warp and 60 to 70 for stringing the beading.

of vertical wires known as heddles, suspended in frames called harnesses; the latter carrying the separate colors, and movable to raise or lower by foot power, so as to properly separate the pattern yarns. Another horizontal roll is in front, to wind up the finished web; a lathe, which carries a reed, fence-like frame for keeping the warp threads separate, and which "beats up" the woven part more firmly, after each "shot" of the shuttle.

One of the best specifications for building a foot-power loom, by Frank P. Lane of Hill Institute, Northampton, Mass., is to be found in the *School Arts Magazine* for June, 1912, pages 1072–1078.

HAND LOOMS. Very likely your great-grandmother sat and wove at such a loom as the upper picture shows. It is much over one hundred years old, and is still in use. The other loom is modern, but made on the same principles. It is not possible to more than refer to the manner of designing such a loom, as it is presented in the working drawings of Plates XVI and XVII. Good examples of old looms may be seen in museums in many cities. A loom may be simply described as follows: Cubical framework with a horizontal roll of wound yarn at the back, which is drawn through eyes in the middle





DETAILS FOR BUILDING THE LOOMS ILLUSTRATED ON THE PRECEDING PAGE

USEFUL WOODEN THINGS

HE who has money can buy almost anything for the home; but he cannot buy the satisfaction that comes from seeing in daily use something he has made with his own hands. By beginning with the simpler objects, and working faithfully during one's leisure hours, one may, as his skill increases, achieve more ambitious projects, and gradually furnish his own room, the kitchen, in fact every room in the house, with useful and tasteful things. Homes furnished largely by the inmates themselves were common in the early days of our country, and throughout the world, before the coming of steam power and elaborate machinery. The hero of John Masefield's "Everlasting Mercy" is not the only one who has meditated on what the change has involved.

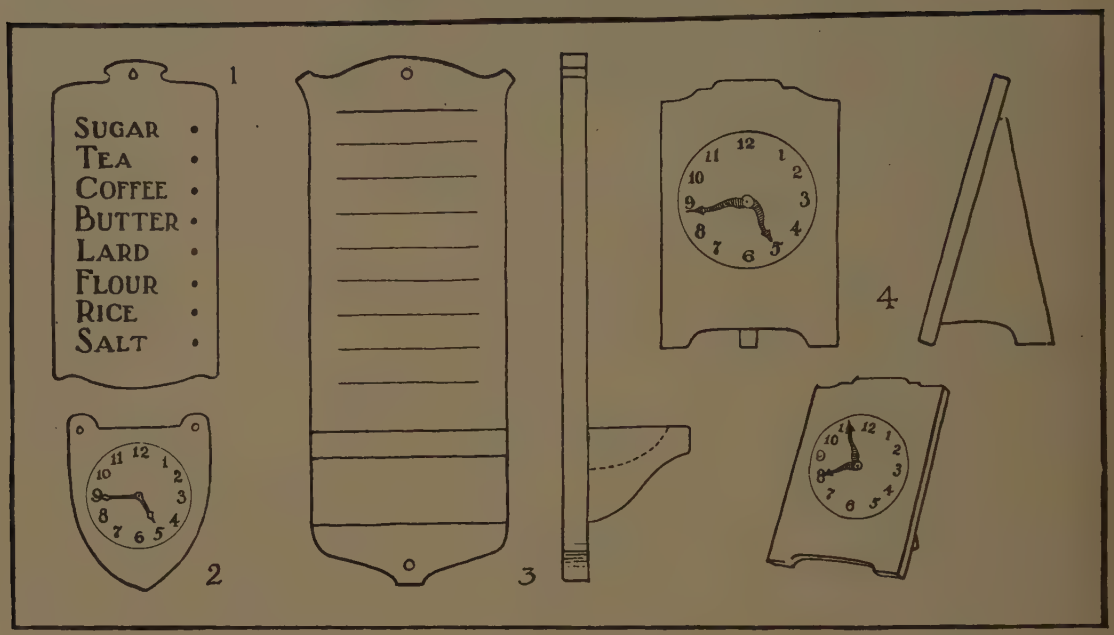
"And then I thought, 'I wish I 'd seen
The many towns this town has been;
I wish I knew if they 'd a-got
A kind of summat we 've a-not;
If them as built the church so fair
Were half the chaps folks say they were;
For they 'd the skill to draw their plan,
And skill 's a joy to any man;
And they 'd the strength, not skill alone,
To build it beautiful in stone;
And strength and skill together thus,
O, they were happier men than us.' "

Individual skill, personal efficiency, multiplied throughout the community—that is the true Commonwealth, the source of perennial satisfactions. From producing the simpler things any community could proceed at last to the building of beautiful churches once more. But the joy of doing such fine things can never be ours, even in a slight degree, except through actual practice in making. He who begins will know, if he persists, that, as Solomon said, "There is nothing better for a man, than that he should make his soul enjoy good in his labor." This joy in the work of one's hands seemed so great to the king that he concluded, "This also I saw, that it is from the hand of God."

The projects which follow are arranged somewhat in the order of difficulty. Elementary wood carving, however, might be attempted much earlier than its position in the text would seem to indicate. In fact an incised line near the edge of the Reminder described below would greatly improve its appearance if it were well done.

A REMINDER BOARD. From stock a half-inch thick get out a board of the required size. The width should be about two and a half inches; the length as many times three-eighths of an inch as there are articles to be remembered, plus an inch more at top and bottom. Top and bottom should be cut to some acceptable ornamental form, such for example as shown in Fig. 1 (page 206). Print neatly the names of the articles required, and bore a small hole after each. In these holes pegs or pins may be thrust whenever it is discovered that the supply of these articles is running low, that one may not forget to order them. The pegs or pins may be kept in a little box near the Reminder Board. A more elaborate form is shown in Fig. 2, where a box for the pegs forms a part of the design.

A REMINDER CLOCK. This consists of a board (designed to hang upon a wall or with an easel back, to stand upon a table) upon which a clock face is drawn, and to which movable hands are added. The hands may be of tough stiff cardboard, thin wood or metal. They should be so attached, by means of a brass fastener, rivet, or other pivot, that they will remain set at any hour. This implement is useful in the sick room for noting the hour when medicine should be taken, etc. See Figs. 3 and 4.



This KEY RACK is something that many of us often wish for, but somehow never get the time to make. It is a simple piece of planed wood, with pegs set at intervals into holes, and fastened with glue. In place of these you could use brass screw hooks. These can be bought in several styles, usually of good design, with the end either curved or bent at right angles. They are furnished with collars so that when screwed tightly against the board they look finished and attractive. The fastening of such a keyboard would vary according to where you meant to put it. A small brass screw-eye in the top at either end provides for hanging.

THE KEY RACK

Boards in the dining-room, where at breakfast times a picture may catch the eye and perhaps noticeably influence the day, besides affording a topic of conversation more profitable than the weather. The Board leads to the habit of collecting the best pictures in color or halftone, and in this pleasant work all members of the family may share. The cultivation of taste is one sure and ample reward. Let one member select for a day, and the others turn art critics. That will make the selection a matter of care. The pictures may be made to represent all kinds of interests—art, architecture, mechanics—and will furnish instruction as well as delight. A good system of selection would be to alternate pictures suitable to the ages of different members of the family. One morning it might be an animal picture, such as the one shown on this page; another, an historical scene, from the noble series by Howard Pyle, illustrating the life of Washington, the originals of which hang in the children's room of Boston's public library. Or a picture of ancient civilization, like Boulanger's Appian Way.

A HOME BULLETIN BOARD may be made a source of entertainment and a practical aid to the enjoyment of pictures. The influence of a picture, like that of a sentence, is often very great. In our day the world is brought to us in a remarkable way through illustration. Plenty of good material is within our reach. The Home Bulletin Board is the place to keep within sight the pictures that are of special value along one line or another.

First, make the Bulletin Board, according to the diagram (Fig. 1); *a* is a piece of photograph mounting board; *b* is a piece of fine wire stretched across this, with the ends twisted together at the back; *c* is a device for holding paper (the "Niagara clip"). Two of these placed on the wire as at *d* hold the pictures, which can easily be changed; *e* is a strip of white wood, to the back of which *a* is tacked, and *f* is a small screw-eye by which the Board is hung on a hook. Of course Boards may be made of different sizes, one for narrow, long pictures, another for wide, horizontal ones. A gray-green board is a good background. The wood strip should be stained dark and rubbed to a dull finish with shellac.

It is a good idea to hang one or more of these

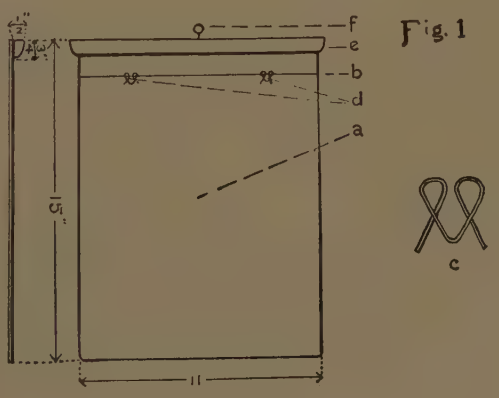
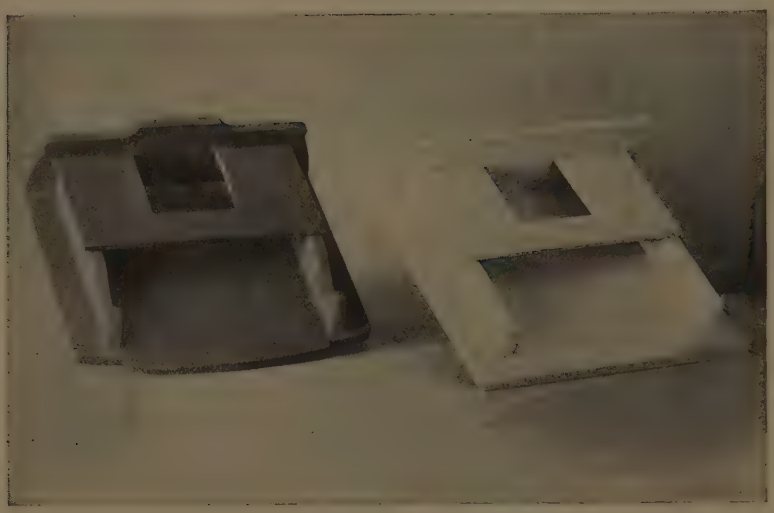


Fig. 1

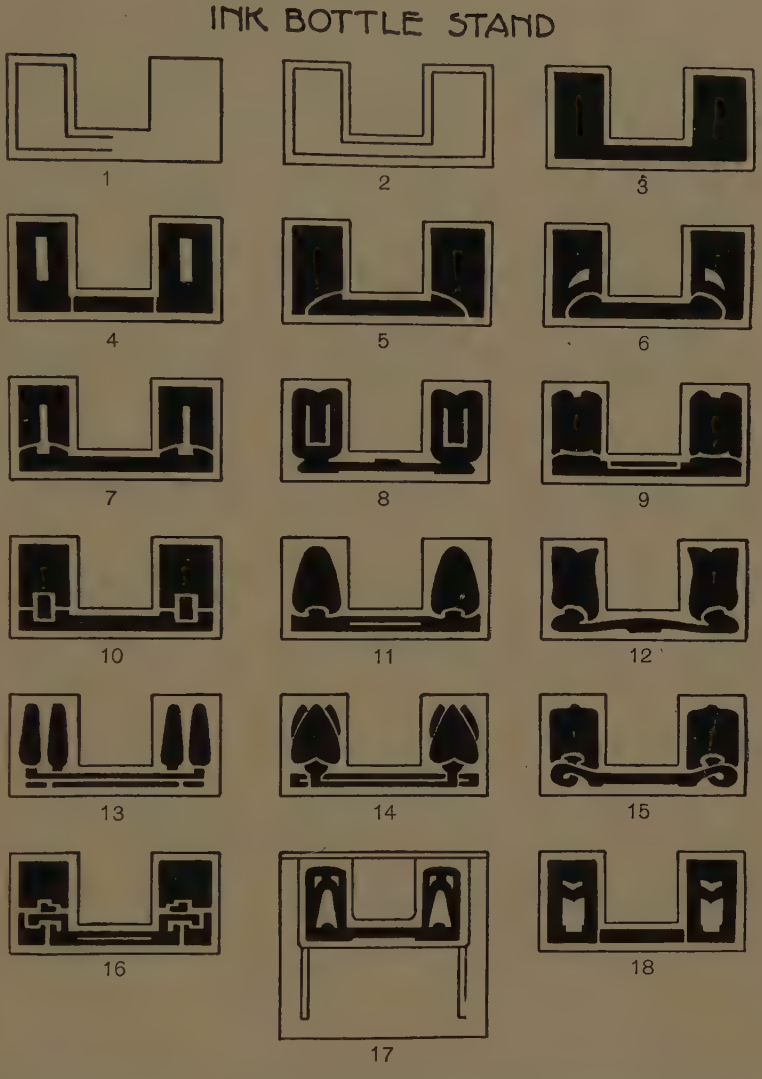


This little piece of joinery is an INK BOTTLE STAND, though, half elevated as it is, it bears at first glance an amusing resemblance to a fireplace. It is shown here in the plain blank, and in completed form. It is decorated with wood carving in simple incised line, inclosing the square opening, with a few curved lines composed to ornament the sides.

On the next page are shown numerous suggestions for decoration as applied to the Stand. We have all suffered, and so has the property in its vicinity, from a tipped-over ink bottle. This is an accident almost sure to happen to the child when he begins to write, but is by no means confined to him. It is to prevent such accidents that this stand was designed. It is meant to rest down flat upon the desk or table, but it might be tilted a little to enable the writer to get at the ink when it is low in the bottle. The notch shown on each side is for the pen to rest in when not in use. In making this stand, very thin wood should be used, the stand must be in good proportion to the ink bottle, and designed with regard to its size. It should be large enough to hold the ordinary four-ounce bottle, and will of course answer for any other not too small.

Such a stand should be made strong, as it is liable to hard usage in the course of its existence; it should therefore be glued together as well as fastened with brads. It requires five pieces, the base, back, top and two sides. In this little article the principles of beauty as applied to joinery are well exemplified. An ink bottle stand could be made perfectly serviceable with these five pieces simply butted together with the corners meeting flush. A plain notch could be cut to serve for the pen-holder and no doubt good work could be done by a writer who owned such an outfit. But that is all it would be — an outfit. It would serve the purpose of holding the bottle safe from accident, and would provide a rest for the pen. But when the eye is tired, when the nerves are overstrung, and we feel "out of sorts" and yet cannot just then desert the task, these plain, hard, ugly shapes irritate us often without our knowing it. It is then that we are refreshed, again without exactly knowing why, if the eye can but rest upon some well-designed shape, something that has been studied out from cause to effect; in which the thought of the designer has a definite starting point from which it develops, and back to which each leading line of the decoration leads the eye. Notice that the base is the largest piece, as it should be, to carry the other pieces. Notice that the back extends beyond the sides and the top, and is finished in an attractive manner by means of two simple, easy curves on each side; and that the top piece with its open square extends a little beyond the side pieces. The two notches in these side pieces, cut to receive the pen-holder, are not mere notches; they are a part of the decorative idea of the whole. The decoration is related to them, they are not mere detached cuts.

Fine joinery is especially to be desired in this little article. While a good joiner does not depend on sandpaper for his true edges, he does depend on it for his smooth surfaces. In order to be fit to receive the finish you propose to give the stand, its surfaces should be worked down to a smoothness which leaves no smallest rough particle when the hand is passed across it. Number OO sandpaper should be finally used. Use both glue and brads in fastening.



Here are eighteen designs made especially for our INK BOTTLE HOLDER shown on the last page. Every one of them embodies good design. Every one is simple, based upon the general shape of the object, which presents a squared area. In every case the arrangement has been related to the outline or edge of the area, rather than any of its divisional lines, such as diagonals. In other words the lines of the elements used in the decoration are parallel, in their contours or in their axes, with the main structural lines of the object. In 3, 4, 10 and 16, all the lines are straight, vertical and horizontal. The beauty in such cases depends upon repetition of line and variety in size of area. In the other designs curves have been introduced to ease the eye with contrasts, and to give it pleasure by variety. A few of the designs, 11, 12, 13, 14 and 15, suggest natural motifs, growing things. Some others are a little mysterious. In 17 one might fancy a yawning pussy cat or pet dog had furnished the motif. The twelfth one, — fourth down on right — is surely a very beautiful design. The tenth — left hand of same line — is confessedly true to its space, rigidly square. Such applications, while always truthful, are not always the most pleasing, because the human eye naturally loves to move along curves. Such fancies as this often control or influence the accomplished designer. But this page of designs will prove to be particularly helpful to you because of its progressive forms. In the first one, you have a mere suggestion for following the direction of the outlines. In the second, this is carried out to the finish. The third is a complete and legitimate design, and provided you could carry such an one no farther, would be acceptable. But in the fourth and fifth we have the plain black space lightened a little, the white illuminating and relieving it. In the fifth the curve is introduced; in the sixth the two curved lines are supplemented by two curved line units. And so on. They suggest endless possibilities in decoration. Good design is reproductive; it is ever suggesting to you what might be done in adapting a developed unit to other forms.

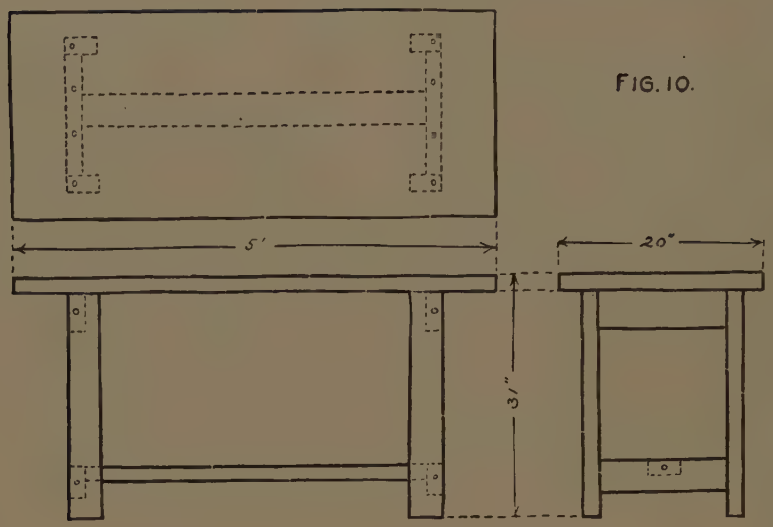
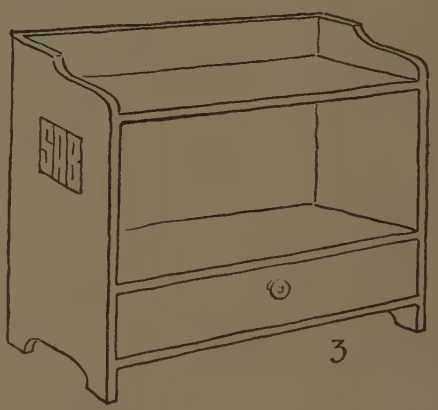


FIG. 10.

Here is a handy WORK BENCH made in the simplest possible form, consistent with strength. For materials get about 18 feet of 2″ x 4″ spruce studding, and a 2″ plank, 10″ wide and 10 feet long. From the 2″ x 4″ studding cut the four legs, each 29″ long, the four cross-pieces each 14½″ long, and one stretcher 3′ 9″ long. Cut the plank in two pieces each 5′ long, for the bench top. To fasten the parts get 1½ dozen lag screws 3½″ long, bore holes located as shown in the drawing, and the bench is ready to go together. Put the legs together first, then put the stretcher in place, and next the top. The upper drawing is a top view, and shows how the parts are related structurally. This answers very well for a bench that will be used for a variety of purposes. But if you are going to do much joinery with it, the top should be set so as to overlap one long side for ⅞″, and a facing or apron-board should be fastened on the side, cutting it as long as the top boards. To this apron-board you can then attach your bench vise. But it is a poor piece of furniture that cannot be made to answer for more than one use. This bench, originally designed as such, is also a perfect table. By making the top a little wider, it will do for a dining table at camp. Used as a work bench it could be made more handy by the addition of a shelf underneath. This could be built wide or narrow as you might wish, and should be supported on lighter cross-pieces screwed to the inside of the legs.

When you have completed the bench you will be eager to make something upon it. Try a BOOKCASE. How graceful and yet simple is the bookcase shown at Fig. 3. No dimensions are given, because such a case ought to be suited to its own special nook or wall space, but it goes well with the bench, supposing that to be used as a table. This one was originally designed for a set of bound magazines. It could be made just the thing for your own books, and with the table for a study place and this case set near,



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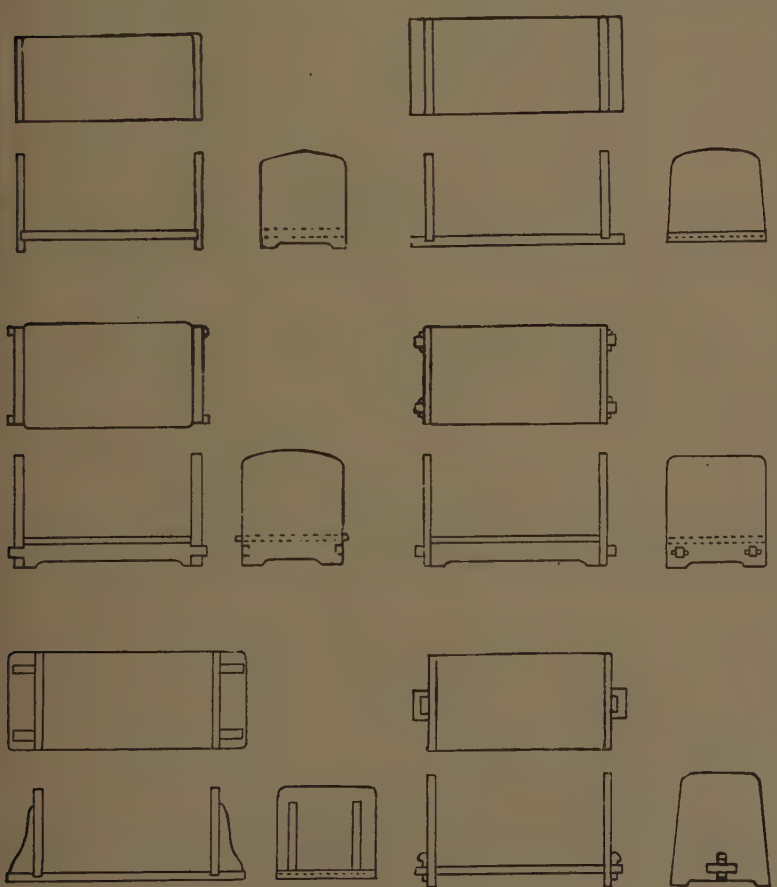
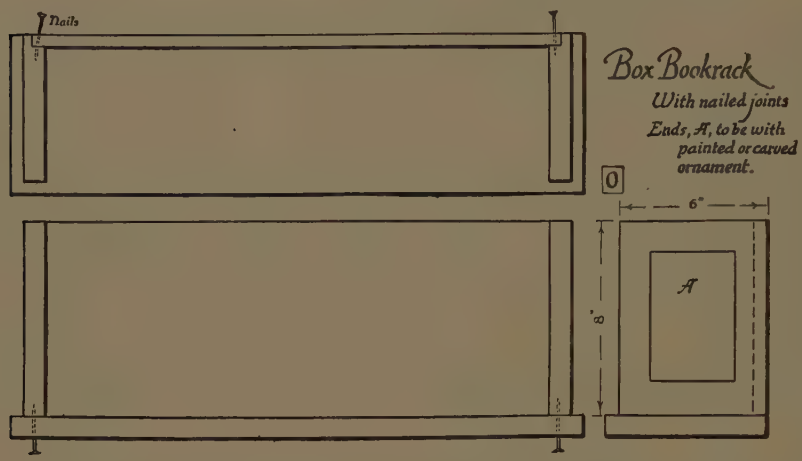
—even on top of the table, — what a cosey corner you would have for preparing your lessons. And be sure to crown and complete it with a plain but beautiful vase or jar of the right color, with a bouquet of the season's flowers or a group of sprays from the outdoor world. As to the construction of this bookcase, no special directions are needed. It is nailed together, the sides of course covering the edges of the back. Allow room enough, in putting the drawer together, for it to slide easily. This particular bookcase was decorated on each end with the initials of the magazine it was intended to hold.

Here is a—fleet, shall we say?—of beautiful BOOK RACKS. At first glance these vertical oblongs resemble a lot of boat sails such as the Crusaders might have hoisted, each with the cross emblazoned upon it. But most of the crusading was done overland, and these well-designed forms can properly remind us of it only from the fact that their shapes have a Gothic feeling, and therefore recall to us the early Christian church and its times. Six designs are shown in outline diagram, each design in three views, top, or plan, side, or long view, and end. It is in the end pieces that we see the principal difference in the designs, and these must be strong.

In the group of finished book racks several other shapes are shown, three of them being of the buttressed form of end, like that at the lower left hand of the outlined designs. Sometimes the lower end of such buttresses forms a tenon, or key, driven down through the shelf to brace the end. To make, first work out your design in full-size working drawings. Prepare your wood, remembering that two sides of a board are seldom parallel, therefore using one particular edge as a base line from which to work. The utmost accuracy must be observed, and plenty of time taken to do the work well. Do not depend on sandpaper for true edges. Its use will not cover, but will reveal to the practiced eye, blunders made in fitting. In the case of bilateral parts, like the ends, work from a main center line in either drawing or making. The beauty of work of this kind, aside from its mere finish, depends upon pleasing proportions.



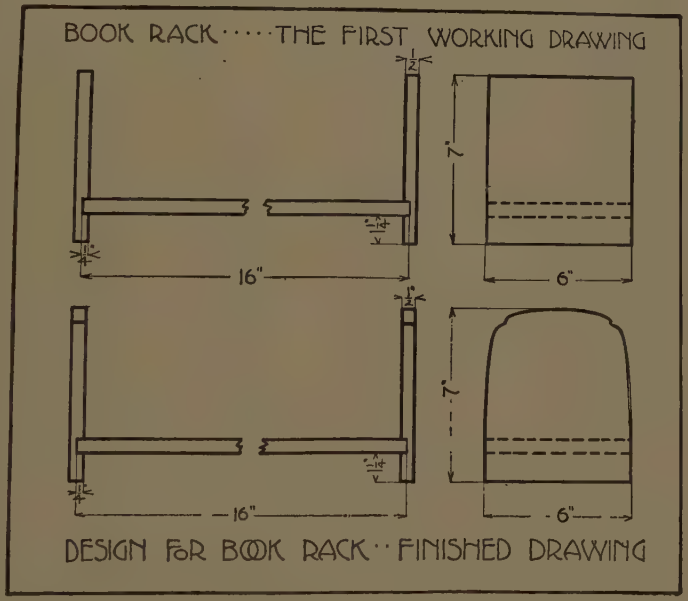


The BOOK RACK shown here is meant to stand against the wall; in fact, at a pinch it might be provided with screw-eyes or pierced with holes and hung upon the wall. But its best use is when set upon a table, back against the wall. The back-board prevents the books from spilling if accidentally jarred, and serves as a strong clamp for the ends. Its correct shop name is a Box Book Rack. What shall we employ as units or symbols in its decoration? Each new piece of furniture thus turned out suggests some new line of thought, and this, followed out, will surely lead to an interesting result. Let nothing tempt you to depart from the staid, sober, safe pathway of Leisurely Effort in making anything, no matter how simple. "Luck" never counts. If someone says it does, and tries to prove it by some experience of his own, tell him that that was simply the exception which is said to prove the rule. It is only by thought, exercised from beginning to end, that we ever do anything thoroughly well. One thing is certain: in an article as plain as this is, every little roughness of finish will show. Each careless movement will leave its mark upon your work. On the other hand each thoughtful touch will have its good effect; it will be there to give pleasure to you and to all keen observers.

The box-rack shown beneath the lamp is another instance of the working out of these problems in home furnishing. It was made by a boy of a ninth grade, and has seen long service in his home. His decoration was made in the form of the combined family symbols of his father and mother. Both happened to come from families who generations back "bore arms," and he selected from both "trickings," as they are called, sufficient material for his unit of ornamentation. It is outlined in a deep burned line, finished in colors. The remainder of the

rack is left in the natural soft wood color, the whole being treated to two coats of orange shellac. It has held the working books of four children as they went through the grade schools and on to college. Its construction is so simple as to need no special directions as to details. The back-board is let into the end pieces by means of a half-lap joint, nailed, and the base is nailed to the ends.

A BOOK STALL. Not hard to make, convenient wherever placed, and also, be it known, a very ancient contrivance. The ends, also, invite your best in decorative ability. It is a step in woodcraft beyond the plain book shelf or rack. To make: Get out the five pieces of board as follows: The two end pieces are of ½″ stock, 8″ x 19¾″. Cut them according to the design shown, or to your own variation of it. The lower shelf, of the same thickness, is 8″ x 17″. The two for the trough are, respectively, 5½″ x 17″ and 6″ x 17″. All are of the ½″ stock. Screw together the trough pieces, the wider overlapping the narrower. This will give a right-angled trough, either side 5½″ wide on the inside. For the bottom shelf, bore for the screws 2″ from the bottom of the end pieces. See side view. Ten inches above this shelf find the center of the end; bore a screw hole. (All of the 20 screws needed should be 1¼″ long, and of a medium stout wire.) This hole will locate the angle of the trough. At a 45° angle, draw a line from this center point to the edge on each side. This will show where the screw should be placed to hold the trough in place. Be careful that the two sides of the trough are fastened in place to preserve the right angle. The dotted screw-lines suggest starting points for a decorative scheme. Instead of butt joints, you can employ the pinned mortise and tenon joint. The books may be set in the trough, each alternately facing the opposite side. Could we have looked into the library-cells of a large monastery or priory of the ages that were so dark to the great mass of toiling mankind, it is probable that we should have seen a book stall very like this one at the side of each studious brother, as he patiently transcribed the Scriptures into illuminated text.



A BOOK RACK WITH WORKED ENDS. Here is an elaboration of the square or oblong form, requiring nicety of hand and a true and keen sight. Its construction is absolutely simple, grooved joining.

Our BOOK RACK should bear some DECORATION. In some few cases the shape alone may be sufficiently attractive, but usually some surface design is desirable. Nearly all shapes are more pleasing, in the long run, for having it, provided it is appropriate. The motif may be geometrical, floral, or even animal form. It may be applied in either oil or water color, or a more elaborate thing may be produced by the pyrographic art. Sometimes a combination, the burning-in of the main lines and oil or water color painting, is strikingly effective.

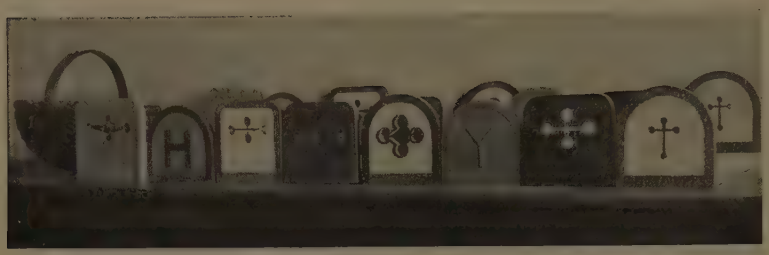
As to its form: It may be an all-over pattern or a florette, within a strong margin line; a border with fine color only in the central space, or with some symbolic device in that space; or it may be a bi-symmetrical or balanced design filling the entire space of the end. And again, the two ends, never seen at the same time, need not be exactly alike. Make trial sketches of different arrangements, giving first attention to proportion and sub-division of space. Think of the uses to which the design is to be put. The flower or other growing thing has ever been the accepted symbol of good literature. The heart, a symbol of love (for good books, in this case), may be introduced, or any monogram or other personal device.

But the style of the whole should be strong and architectural in character. The end of a book rack is not merely ornamental, it has heavy work to do. The three panels shown on this page are full of suggestive material. The first two are of Gothic design, and both are panels of carved wood. The relief in the first one is high, that of the second somewhat lower. The third design is of a modern style, sometimes referred to as the New Art. In some ways it expresses the principles of design more clearly than the second illustration, or even the old and more conventional example. These two designs are such as you find in Germany. They are panels from the sides of old chests. Perhaps you are already something of a wood carver. If so, you will be able to go ahead and ornament your book rack without much trouble. In the later pages of this section of this book you will find helpful information about the practice of this ancient and noble art. But if you have not studied carving you will find it rather hard to begin without help. It is pretty certain that you will not be able at first to fulfill your highest intentions. But that interesting appliance, the burning-point, offers a kind of substitute for the carving tool. With it the design may be either lightly traced in a dark line, or outlined with a very deep one. But you can also actually model the surface with it. Do not misunderstand this to mean that you are to try and make one tool do the work of another. Therefore do not try to reproduce by the burning-point such a design as the beautiful Gothic panel at the left. The myriad scorings of the burning-point would never appear like the surfaces patiently and lovingly cut out by the carver. But as applied to the deepening of such a design as shown at the right, the burning-point becomes a welcome partner to the brush and color. Such a design, drawn in light colors upon a dark ground, with the accents and deep shadows still further deepened by burning in, presents an effect not to be had by one process alone. Touches of gold paint might be used sparingly with the color, to serve as sharp accents. Or, an effective scheme would be to paint it black, two coats, or better three, each well dried and rubbed down with a pumice-and-oil cloth, and upon this fine surface paint the design in an ivory white, adding the natural tones.

Here are four more designs adaptable to the ends of BOOK RACKS. All four are of the general style of the New Art. The upper left-hand design shows a Japanese influence. The one at the right reminds us of the seal of Harvard College, the open book with its lofty inscription: "Christo et Ecclesiae."

These offer good opportunities for pyrography. The effect of the design as shown here, black upon light gray, might harmonize well with the room in which your book rack is to be placed. The design could be carried into an entirely different scheme of coloring. In the case of the heart design, a pleasing effect could be produced by having the heart red, its light accompanying drops painted in an ivory white tint, and the background of the heart burned down and colored a low rich purple. Reduce the red in intensity by mixing green with it, and use it to paint the narrow border now showing in medium gray. The broad surface between might be a dull green, likewise neutralized by the admixture of red. For the lower left-hand design, the greens and reds of the rose bush are almost demanded by the design itself. Initials or a monogram might be adapted to the central ellipse, but either the roses or the ellipse design should be made the stronger, lest the two elements vie with one another in attractive power and so destroy the unity of the design.

The design in the lower right-hand panel offers most of all the chance for good coloring, for it demands delicacy of treatment in color to harmonize with its playful lines. The motif is the wild rose, and the colors most appropriate for this design are a tint of red, or a yellow with a harmonizing hue of green for the leaves. A normal green is produced by mixing about three parts of yellow with one part of blue. This may be made bluer or yellower at will. The tints are obtained by the admixture of white pigment if you work in oils, or by adding water if in water colors. Burn in the outlines and finish the background in the natural wood. Shellac the whole.



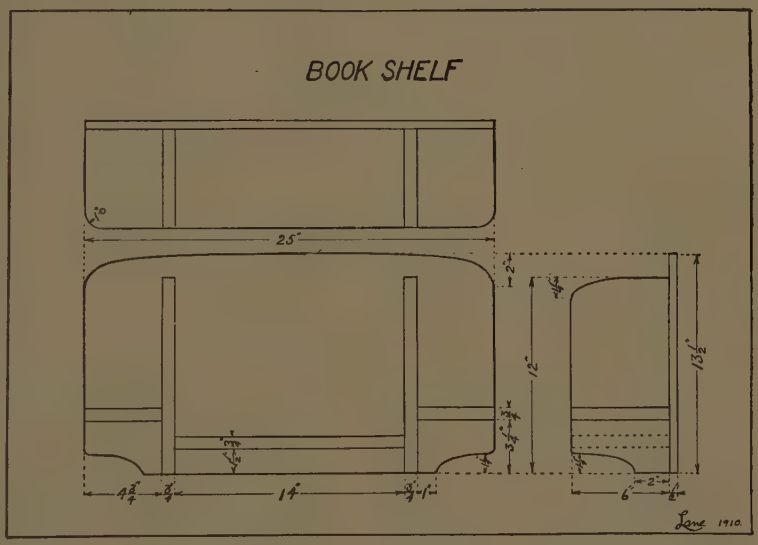
But bad work is a perpetual rebuke.

The book racks of the second lot have rigid ends; the long one, shown lengthwise, on which five others are resting shows the shelf slightly let into the ends. The joints are both glued and nailed. The ends of some of the others are mortised into, but not through, the shelf.

The BOOK RACKS shown on this page were made by the boys in a large private school and are worthy of a place in any furniture shop. These, you will notice, are mostly of very simple design, four of them suggesting the quarterfoil and one the cross. Two have the initials of their owners carved upon them. They are thus temperately decorated. Good drawing and well-considered contrasts in values are responsible for the fine effects. The racks in this particular lot were all built with hinged end pieces, to fold conveniently for packing. In designing racks of this sort be sure and provide for accurate work. Have all the lines and surfaces perfectly worked. This means great care and slow progress.

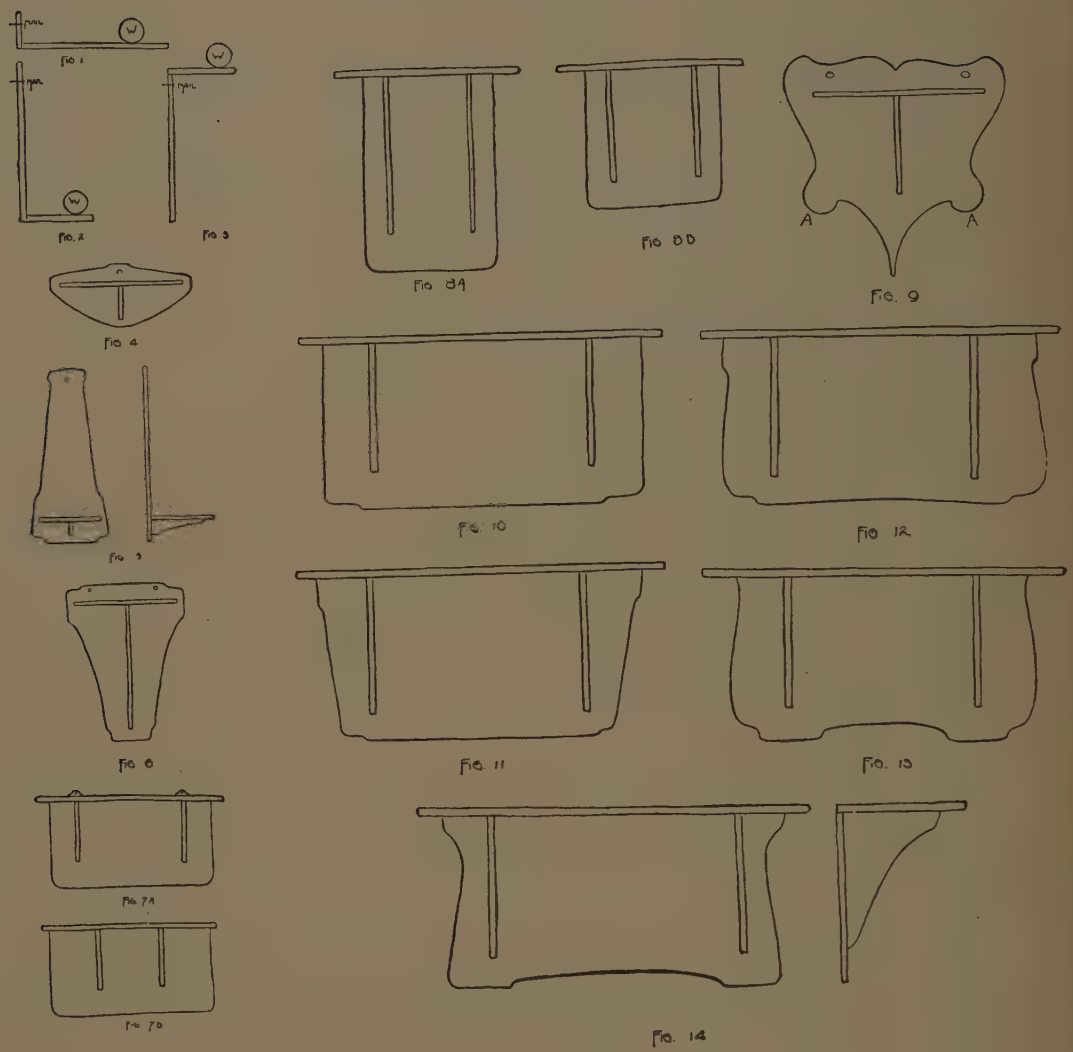
Here are seven shapes, no two of them alike and yet varying but little in their general form. All are modified oblongs, the outlines of the tops and sides varied by slight curves. In making the rack shown in the lowest picture, be sure to have the mortising for the two long keys that help hold the ends rigid slant a bit, so that the keys will wedge and press hard against the upright ends when driven home. A very effective finish to oak wood may be had by placing the article in a close box and subjecting it to the fumes of concentrated ammonia for about twenty-four hours, after which it should be waxed. Another good finish is to paint on lampblack and turpentine, and wipe off. Any cabinet worker can show you a good finish.

This beautiful WALL BOOK SHELF has been made by grammar grade boys and girls. The two uprights may be planed up together from one rough piece $\frac{7}{8}''$ x $6\frac{1}{2}''$ x 25″; and the three shelves from a piece the same size. The back will require a rough piece $\frac{5}{8}''$ x 14″ x $25\frac{1}{2}''$, planed square and true before laying out the curves. For the back, work from a paper pattern, made double and unfolded. Saw out, and smooth to the line with chisel and spoke-shave; then sandpaper. Nail the uprights to the smaller shelves, using $2\frac{1}{2}''$ No. 12 brads; nail the uprights to the long shelf. Screw the back to the front parts with 1″ No. 8 screws; put four in each upright, two in the long shelf, and one in each small shelf near the end. Set the nails, covering the heads with putty or glue-and-sawdust paste. A good brown stain may be had by thinning burnt sienna, burnt amber ground in oil, and "drop black," or black ground in Japan, with turpentine or gasoline. For a green use Prussian blue, or ultramarine, medium chrome yellow and black. Apply with a brush; rub down with excelsior; allow to dry 24 hours; finish with floor-wax. A very thin coat of shellac, applied before the wax, giving ample time for it to dry, will give a better finish.



A soft, rich brown may be produced on white oak, chestnut, butternut, and sycamore by fuming with ammonia. Place the article to be fumed in a tight box — a packing box lined with paper pasted to the inside is good. Place the ammonia in a shallow dish in the box, close tightly, and leave for several days. Finish with wax, or if a darker shade is wanted, use linseed oil. The common household ammonia will answer, though the concentrated ammonia is better.

The shelf may be screwed to the wall by two screws put through the back 6″ above the shelf and $1\frac{1}{2}''$ from the uprights, or it may be hung from the picture molding by wires. Drill two holes 1″ from the top of the uprights, and 1″ each side of the center, put the wire out through one hole and back through the other and twist the end around the wire that goes up to the molding. Use piano wire.

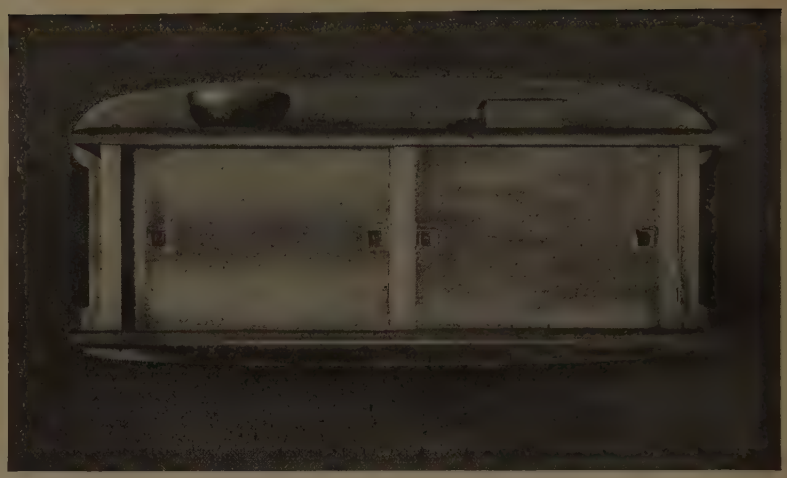


Some WALL BRACKET DESIGNS. Many brackets are bad in shape, because not suited to their purposes. The right shape depends on what you wish to have the bracket hold, a clock, a statuette, a candle, a match-safe, a piece of pottery. Therefore size is an important factor. Next comes the sort of support required. Our diagram drawings illustrate some of these elements. The bracket must be secure, so as not to spill what it is meant to hold. In Fig. 1, the leverage on the very long shelf is certain to make the bracket impractical. Figs. 2 and 3 are the opposite, oversecure in wall attachment. Next, the bracket must not tilt sidewise; it must have "lateral stability." Fig. 4 is unstable in this way. Two ways may be taken to secure stability — Fig. 5, the "long hang," and Fig. 6, the "double hang." The latter is the safer. The way the grain runs is another source of strength or weakness; wood shrinks, and parts nicely fitted will sometimes draw apart. A shelf might be cut just as wide as the back, but if the back should shrink, the two would be even no longer, and it would suggest poor joinery. Moreover, good design is always good construction; a back and shelf exactly flush at both top and sides would look "skimpy."

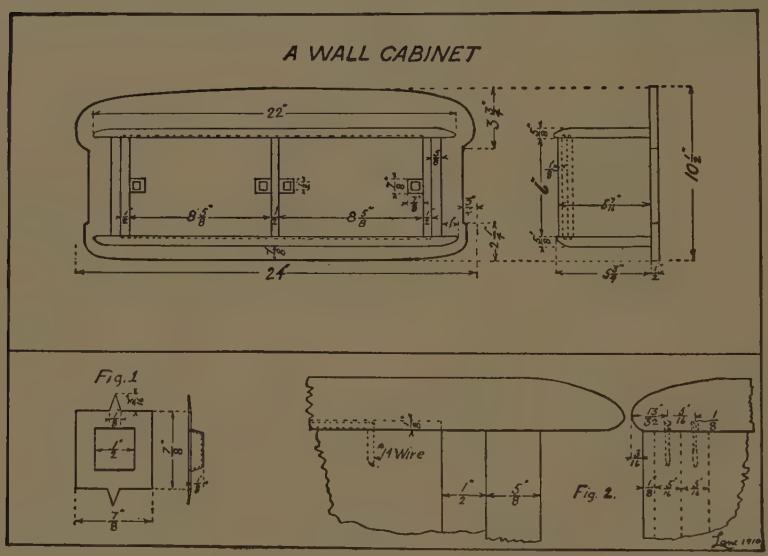
Supposing the shelf grain to run back and front, and the back grain up and down, both would shrink alike; but in this case, the grain of the shelf would not rest across the supporting piece, the bracket proper; it would be apt to split from front to back if the thing it held stood on one side of the center. The matter of this uneven shrinkage of shelf and back is prevented by not trying to have both the same width, and this really improves the design. Figs. 4, 5, 6, and 7A and 7B illustrate this. Here we have at least variety in the parts. The grain of the support of Fig. 6 should run vertically, for then it can be securely nailed or screwed to the back. Nails do not hold well when set through into the ends of a grain. But if the support must be vertically short and horizontally long, as in Fig. 5, then the joinery should be of the grooved or mortised type, and glued. Again: the direction of the grain of the backpiece is governed by its relation to the front parts. In a single support, as in 4, 5, and 6, the grain would naturally run up and down, for here the shelf acts as a cleat, whereas in a bracket with two supports, as Fig. 7, the grain of the backpiece should be horizontal, for thus the parts best support each other.

Let us consider the bracket with two supports and a backpiece that is cut off flush with the shelf (Fig. 7). It must then be fastened to the wall by small hand-made plates of copper or brass, as shown, or it might be by simple screw-eyes. Let us make it of whitewood with a shelf not more than ten inches long, to hold, let us say, one or two choice bits of pottery. The first big consideration is that of areas — the relations of the different spaces of shelf, back and supports to each other, the distance apart of the supports, etc. In getting at the refinement of these relations, that is, in making a bracket that shall be the best designed we know how, it will help if we remember, for instance, that squares are not apt to please as much as oblongs, for they are more regular, more monotonous. But even in oblongs, let us keep to the subtle side. An oblong that is plainly twice the width of its height, as a glance will tell you, is not so attractive as one wherein the relation of its width to its length or height is not so plain.

Of course the outline we wish to give to the bracket will influence this somewhat; but it should not rule it. The original form is only to be qualified, not changed. The rounded corners, A–A, Fig. 9, detract from the general shape. Also, the lowest point over-emphasizes the middle support-line, which is thus made to look small and weak. Harmony, the same general thought in the shape of back, supports and shelf, is also desirable. The other figures show how the structural lines, as a basis, are amplified by other lines, straight lines by curves, and curved lines by straight ones. But all hold to the main thought. The same idea is expressed in the picture of decorated brackets on this page, where the shapes of the designs are seen to be adapted to the shapes of the wooden surfaces they occupy.



A WALL CABINET. This cabinet may be used for holding any of a variety of articles, and it is in itself a thing of beauty. Make the back with a double paper pattern. It is of a very simple box construction, with closed ends, and two doors which slide past each other. For handles, each door has a little square depression lined with copper, into which the finger-end is placed when moving the door either way. These doors slide in grooves cut in the top and bottom of the cabinet. For guides or runners, a length of large wire is used, fastened to the top and bottom of each door, the wires just filling the grooves.

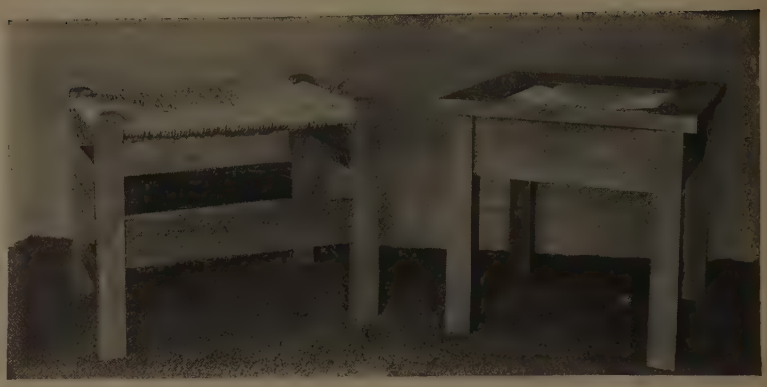


Each door is finished at the end by nailing on a cleat, as shown in the diagrams. In making, the ends, doors and door cleats should be planed in one piece. The end cleats of the doors should be nailed on with 1½" No. 16 brads; put no brads near the center where the handles are to be set in. The doors lap ½". The runners for the doors are made of four pieces of No. 14 gauge wire, 8" long. Bend ½" of each end at right angles, and drive into holes made with a drill or bradawl in the top and bottom of the doors. Lay out the grooves in the top and bottom, with the gauge, before the edges are rounded, and take out the wood between the gauge lines with a narrow chisel.

A gauge in which a small knife-blade has been substituted for the regular point will be found convenient in cutting such grooves, in splitting lumber ½" and less in thickness, etc. For the handles four pieces of No. 26 gauge copper, 1½" x 1½", will be needed. Anneal the copper by heating it red hot and plunging it into water. The pattern is shown at Fig. 1. Notice the sharp spurs or points at top and bottom which are to be bent at right angles and set into the wood. Cut with bit and chisel, a hole ½" x ½" x ⅛" in the end of a hard-wood block. Drive the copper into this with a wooden punch 7/16" square and 3" long. Flatten the surface with a block and hammer. You may have to renew your punch. Lay out the rim and its points and mark on the wood to countersink level with the surface. Set holes with knife-blade for the points.

This FOLDING SCREEN will look well in your home; yes, in *your* home, for you can surely make it, whether you are a girl or boy. This one was made by a boy only thirteen years old, in the eighth grade of a Massachusetts school. No wonder his work received several first prizes! Only one panel of the screen is shown covered. As to the construction of it, select six pieces of stock, 1″ x 2″, cut whatever length you choose. A good design would be to have the screen 5′–0″ tall, and each leaf or frame of it 18″ wide. This would require for the nine cross-pieces a length of 14″ each. They should be of the same size stock, and be joined to the uprights by whichever joint you are master of. It might be the simple butt, where the ends are held by screws set from the outside of the upright piece; the mortise, either blind or through; the halved tee, or the beautiful bridle joint. Look these up in any good woodworking book, and see what your sharp chisels will do in obedience to your true eye and steady hand. Hard wood will wear to look best because it will not dent. When you have got the joints fitted, smooth-plane the top edges of the uprights, and put the frames together with screws or glue, or better, with both. In placing the hinges, remember that each pair of hinges sets so as to enable the leaves of the screen to fold in opposite directions.

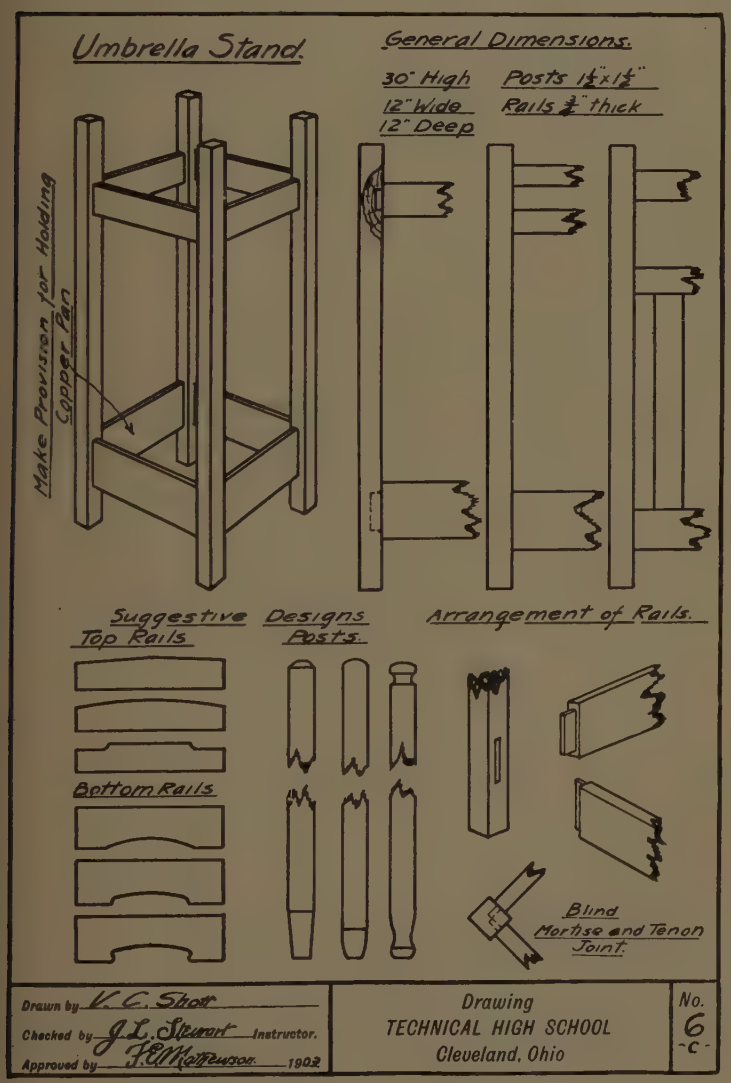
Having finished the building and assembling of the screen, its color scheme is the next problem. This will depend, of course, on what you have in your home in the way of wood finish. What is the standing inside finish of the room in which the screen is to be used: the wainscot, if you are so happy as to have this old-fashioned form of beautiful lower finish, or the woodwork of your furniture? If it is to stand near the fireplace, you ought to consider the woodwork of that, too. Suppose you have made it of oak, and wish it to match the big Morris chair, which is stained a dark olive green. You can buy the stain, and having applied it, rub down the "burr" that it has raised, using a handful of the commercial curled hair. Apply a second coat, and when that is dry, give it a last finish with shellac, rubbed down between the coats to a beautiful dull finish, with an oiled rag dipped in powdered pumice. The natural color of hard wood, if properly finished, is beautiful in itself, but oak wood develops other beauties when stained or subjected to a process known as "fuming," which you can read about on page 217. The screen may be covered as shown, with any of the suitable art fabrics, having the color you desire. The wash silks, decorated with stenciling, as in the illustration, are suitable.



And now how about the DRAWING TABLE shown at the bottom of the page? Looks hard, do you say? Yes, but not impossible. The table shown here was really made by a boy, and a boy in only the eighth grade of a public school at that. He was a pupil in the training school connected with a State Normal School in the Middle West. If he could do such work, why not you? Certainly with the occasional help of your Manual Training teacher or of an older brother who has done such work, success would be yours. The table is really very simple in construction. It has no complicated adjustments, but can be raised or lowered to any height or angle that is desired, and is rigid and stable. The base or stand is easily taken apart and packed into the shallow box seen beneath the drawing board, for convenience in moving or for temporary storage. The height, slope and general convenience of our work tables are matters of importance, for they affect our nerves, tempers and general health.

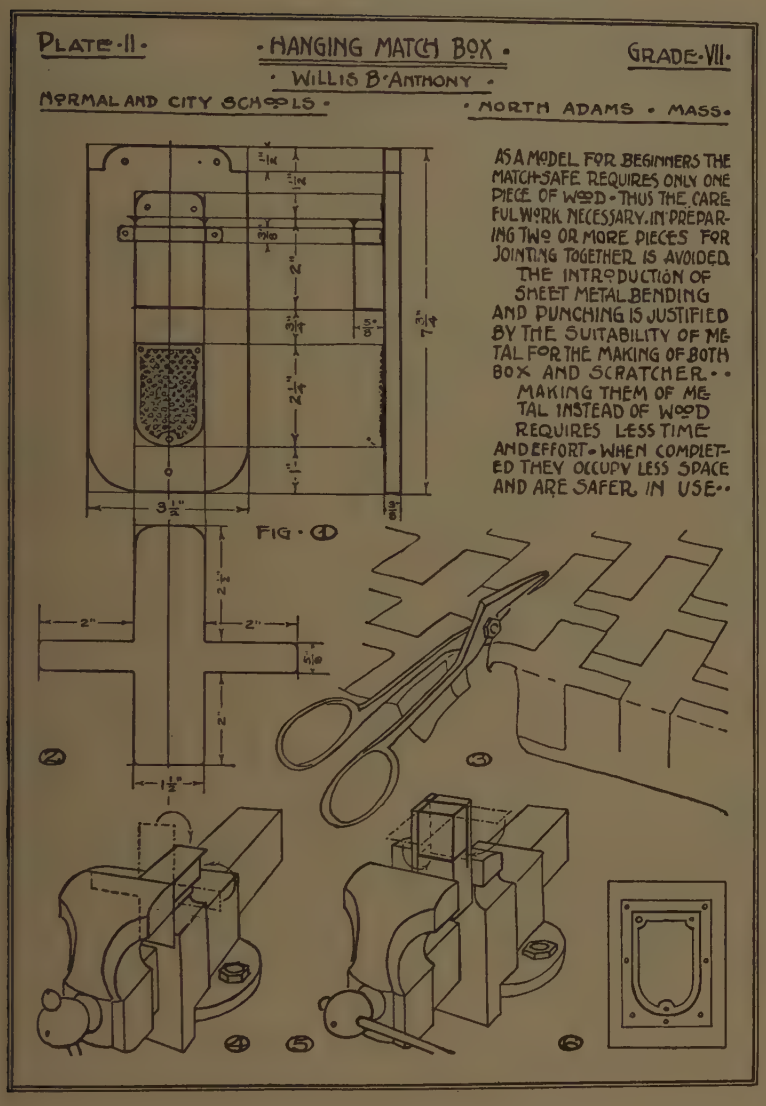
For those who are often moving about, like the boy who is first off to a preparatory school, and then to college, a light-framed FOLDING BOOK RACK will be found very convenient. Several views of finished racks of this sort are shown in the middle picture. These need but little in the way of directions. The right-hand rack in the lower part of the picture is hinged by having the lower part of each end extended to fit snugly between the rails of the shelf, and a pin of heavy wire passed through this extension and made fast by heading. The ends may be solid or framed, and may be decorated either by a painted panel or by wood carving. Even simple chamfering on the two outside edges of the end uprights will add to their beauty of appearance. A step further on the pleasant way of joinery is taken when we attempt the STOOLS shown in the upper picture. The cross-pieces are mortised into the posts. The two styles shown here illustrate two methods of securing great strength. Of the two, that at the left is rather the more attractive to the eye. The method of seating is by the old-fashioned weaving of the common "cat-tail" rushes, dried and twisted into strands. This is explained later on in this book. It results in a most pleasing and enduring form of seat.

An UMBRELLA STAND. Have you ever read how the first umbrella was carried in London by Jonas Hanway, and what ridicule it excited because it was thought to be effeminate? Women had used them for some time, and as far back as the days of good Queen Anne they were used as expensive sunshades. They are very ancient as an institution, for the sculptures of the Assyrians often show them, as do those of Egypt. But how necessary they now are to all of us who pretend to be civilized! We recognize them as economically related both to clothes and to health. There is no virtue in going cold and damp. But what very bad shapes have been forced upon us in the way of umbrella stands. It is worth while to be able to produce something



similar to the design here shown in diagram and illustration. Perhaps the upper part, the panel in rustic effect, is a bit difficult for the beginner, as its members would have to be fitted with the "halved cross" joint where they intersect. Straight vertical rods, square or round, may be substituted, if you feel unequal to the task of producing the curves. This stand is a simple and very attractive piece of joinery in its main parts. The diagrams do not follow the particular stand illustrated in the upper picture, any further than the general plan and shape; they offer suggestions for your own working out, variations of the design. Hard wood should be used, if possible, though soft wood will answer, always remembering how easily it will dent. The posts should be finished at the top after some approved design, and the rails joined to the posts by blind mortises. Stain and finish to your taste, that the stand may look well in its place in your house.

A HANGING MATCH BOX. Our fathers used to call them match "safes," because the earlier matches were uncertain things at best and were justly thought of as somewhat dangerous to handle. It were well if we took this view of it to-day, for the many so-called "parlor" matches, "snap" matches, and the like, are too often easily ignited, and are the source of many great fires. It is therefore well to consider this characteristic of modern matches in designing the box which is to hold them. Our special box is made partly of metal and partly of wood, and it embodies the principles of good design. It is upright, so that the last match, even though leaning in a corner, will be seen, and you would not have to grope about with your finger tips to find it in the dark. All corners likely to be touched by the fingers are slightly rounded. The upper edges are turned outward so that the chance broken match may be picked from the box without injury to the hand. The scratcher is located below the box, for safety's sake. Otherwise a match, if broken off short in scratching, is liable to fall into the box and ignite the others. The design also seeks a reasonable economy. The wooden panel which forms the wall-back has no useless expanse of waste area, left simply for decoration. It might indeed be decorated, let us say for instance with a burned line following the outline, but more than that would be superfluous because forced; there would be too much panel for the useful part. The size of a thing is not to be increased solely to afford room for decorations. In the pattern of the scratcher the upper edge is straight to match that of the under side of the box; at the bottom, however, the abrupt change from vertical to horizontal is softened by rounding the corners into simple curves. These again correspond with those of the bottom of the panel. And so each part is thoughtfully planned to harmonize with such other parts as it is related to. To make, get out the stock for the wood panel $\frac{1}{2}''$ wider and longer than the finished size is to be; reduce to the right dimensions and cut the curves with a coping saw. The paper pattern is best made doubled and unfolded for


PLATE·II·
·HANGING MATCH BOX·
GRADE·VII·
·WILLIS B·ANTHONY·
NORMAL AND CITY SCHOOLS·
·NORTH ADAMS · MASS·
AS A MODEL FOR BEGINNERS THE MATCH-SAFE REQUIRES ONLY ONE PIECE OF WOOD · THUS THE CAREFUL WORK NECESSARY IN PREPARING TWO OR MORE PIECES FOR JOINTING TOGETHER IS AVOIDED. THE INTRODUCTION OF SHEET METAL BENDING AND PUNCHING IS JUSTIFIED BY THE SUITABILITY OF METAL FOR THE MAKING OF BOTH BOX AND SCRATCHER.·· MAKING THEM OF METAL INSTEAD OF WOOD REQUIRES LESS TIME AND EFFORT · WHEN COMPLETED THEY OCCUPY LESS SPACE AND ARE SAFER IN USE··
FIG·①
2"
2"
1½"
②
③
④
⑤
⑥

working. Both sides will then balance. The diagrams upon this page show the method of getting out the blank for the metal box. This is suggested for class use, and so shows many repeats of the pattern. Use copper or brass as you choose, of a thin gauge-number, which will bend easily.

You will need tinsmith scissors and a file for finishing the rough edges of the metal. Do not rest satisfied with anything but the smoothest edges. Slivers and notches, however slight, will not only look badly, but may cut someone's hands. In this as in all good work, plenty of time is necessary. Throw your strongest influence against the deplorable tendency of our day to "hustle." Let your work be the very best of your class. This result will only come about when you refuse to be hurried. The blank for the box, Fig. 2, is easily bent into shape; the lower part bends upward and the two sides are then bent inward to meet it. There is no soldering nor other joining of the side edges, except that they are held in place by the strap of metal which is bent to fit around the box and is then tacked to the wooden panel. The blank for the scratcher is likewise to be cut larger than its completed form requires, particularly because it must be tacked firmly down upon a block while it is being indented with a pointed nail to produce the rough surface. This stage is shown at Fig. 6. Be sure that the little dents are of the same depth, to insure an even roughness. The views at 4 and 5 show how the vise is employed in bending into shape the metal blank for the box. In Fig. 4 the dotted lines show the invisible edges of one side and the front; the dot-and-dash lines the position of the other side and back, before bending. The heavy lines show this side and back after they have been bent over the top and side of the farther vise jaw. Fig. 5 shows how the box is finally snugged into true bending by means of slits sawed into a hardwood block. To finish, sandpaper the panel and stain it of a color suggested by the metal. Clean the metal with an eraser, and polish it. Tack the box and scratcher on to the panel.

A PEN-AND-INK-STAND. This is made of wood with a metal holder for the bottle. The stand consists of four wooden parts and one brass strip. It is shown in front view at Fig. 1, and side view at Fig. 2. Fig. 3 shows the form of the base in perspective, and in dot-and-dash line, the back set upon it, with a drill-bit setting holes for the nails at the proper places. Figs. 4, 5, 6 and 7 show the strip of metal with the stamped design in four stages of development. The two brackets standing upright against the backpiece are cut into notches at the top to hold pen-holders or pencils. Here is another lesson in structural design, embodying the same great principles that govern the architect in planning the dimensions and proportions of a great building. Each structure is limited by its use. Within these limitations, however, we must seek the further refinement which gives us beauty. In this object all dimensions originate in the size and shape of the principal thing about it, the ink bottle. A large size bottle (the common "ten cent" size) is chosen, that the parts may be of a size easily workable. The brass bends about the bottle and its ends are fastened to the back. The distance between the outer edges of these ends determines where the brackets shall be set and affixed to the back.

(See front view.) The width of the top of the brackets is determined by placing three pen-holders or pencils side by side, with distance between them for easily lifting one out without disturbing the others. The brackets should be high enough so that the nearer pen or pencil does not hide the printing on the little calendar pad that is placed between them, above the bottle. The size of the base is influenced by what it is to support. Its edges are beveled so as to relieve the sudden change from the verticals of the brackets and back to its own horizontals. They also, at the ends particularly, repeat the oblique direction of the rounded top of the bottle, and of the top of the back. The whole thing should thus be in harmony. In making, select the best edges of each part to be in view. For the points, where the parts are to butt together, select the best ends, *e. g.*, ends of the grain. Material varies much, and you are happy indeed if the "best surface and best edge" of a board come right to serve the purpose. In making the brackets, select your two pieces, nail them together out-

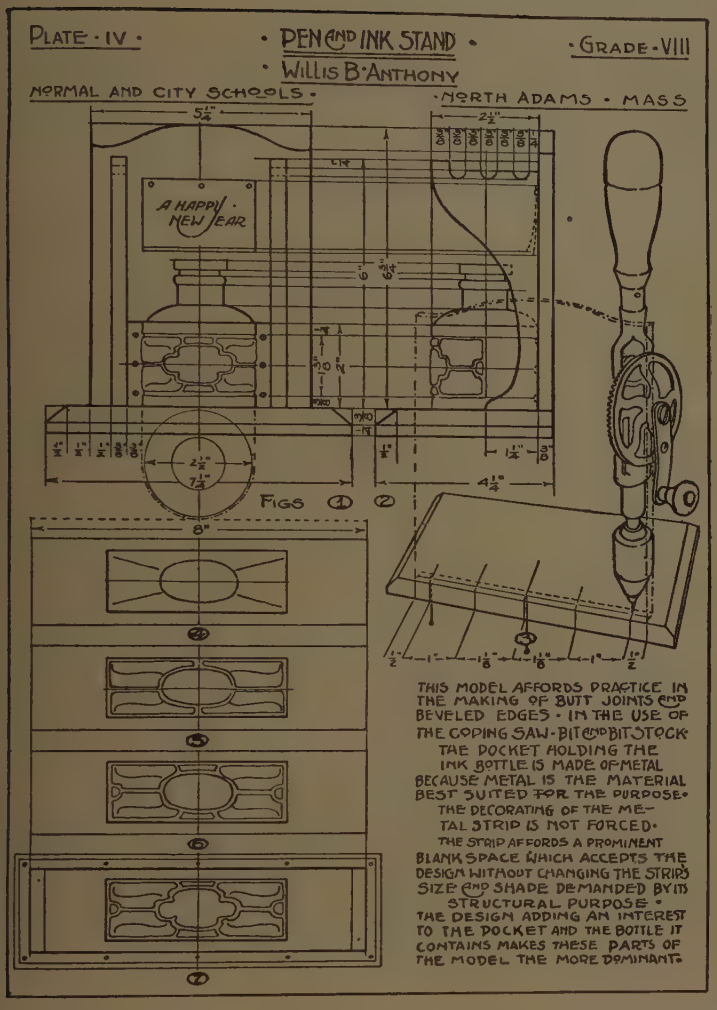


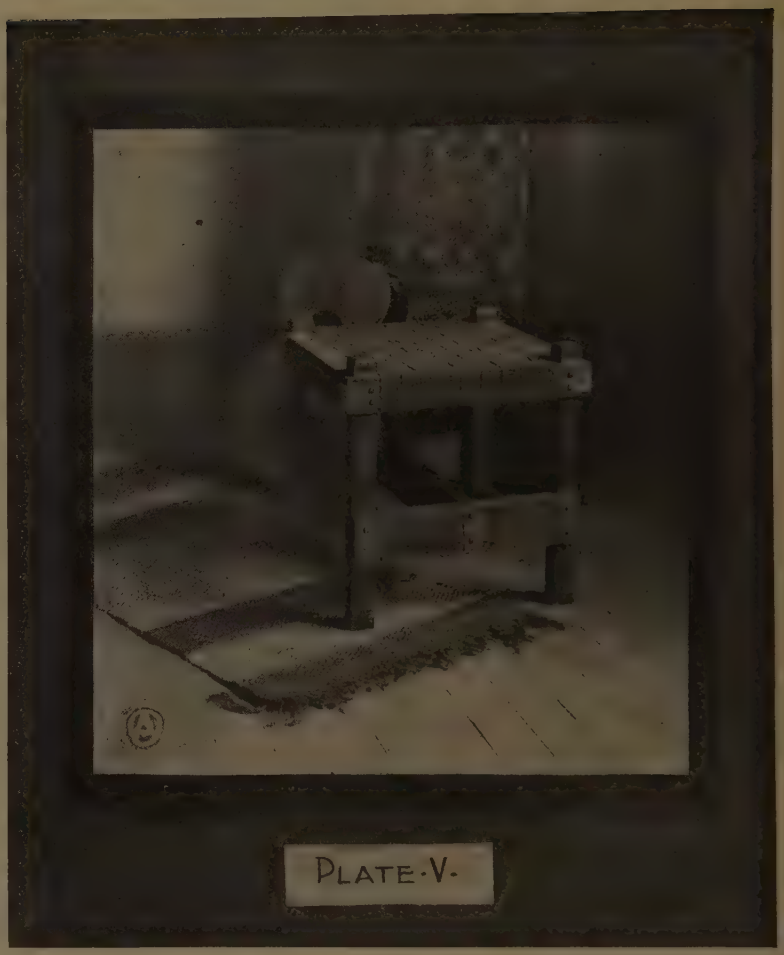
PLATE · IV ·
· PEN AND INK STAND ·
· WILLIS B. ANTHONY
· GRADE · VIII
NORMAL AND CITY SCHOOLS ·
· NORTH ADAMS · MASS
A HAPPY NEW YEAR
FIGS 1 2
THIS MODEL AFFORDS PRACTICE IN THE MAKING OF BUTT JOINTS AND BEVELED EDGES · IN THE USE OF THE COPING SAW · BIT AND BIT STOCK · THE POCKET HOLDING THE INK BOTTLE IS MADE OF METAL BECAUSE METAL IS THE MATERIAL BEST SUITED FOR THE PURPOSE · THE DECORATING OF THE METAL STRIP IS NOT FORCED · THE STRIP AFFORDS A PROMINENT BLANK SPACE WHICH ACCEPTS THE DESIGN WITHOUT CHANGING THE STRIP'S SIZE AND SHAPE DEMANDED BY ITS STRUCTURAL PURPOSE · THE DESIGN ADDING AN INTEREST TO THE POCKET AND THE BOTTLE IT CONTAINS MAKES THESE PARTS OF THE MODEL THE MORE DOMINANT ·

side of where your finished work will come, and then make your paper pattern and trace from it. At this time begin the notches for the pens and pencils.

To do this, with a bit stock and a $\frac{3}{8}''$ bit placed according to the tracing of the pattern, bore nearly through the brackets, stopping when the point of the bit comes through, but not the whole of it. Then reverse your work, set the bit-point in this hole, and bore back through the thin wood remaining. This is to prevent the splintering of the hole at its edges. When you have these holes neatly bored, saw the top straight across from the back up to and across the last hole; but there stop, as you will probably want to allow a crest of wood on the front of each bracket, as shown in Fig. 2. All sawing of curved edges must be done with the coping saw, often called the bracket saw. To use this delicate blade well is in itself quite an art. The tops of the brackets must be finished with the round and flat files. Sandpaper all parts separately and nail together, nailing outside nails of any row first, and only part way in, before driving those nearer the middle of a row. In short, go slowly and force things into shape gradually. Thus you will avoid discouraging splits and breaks. Countersink all nails and fill in the holes with putty, stained brown. Sandpaper again and finish with a brown stain mixed with a yellow suggested by the brass color.

Lay out the dimensions of the brass strip on paper, allowing $\frac{1}{4}''$ all around. Draw then the finished design. The strip is nailed to a board through this extra $\frac{1}{4}''$ margin, while the design is being stamped. This strip, viewed from in front, is an oblong, wider than it is high. This gives us a hint of what the shape of the principal decorative form should be. The strip will be seen on the average more from the front than the sides, therefore the interest is centered there.

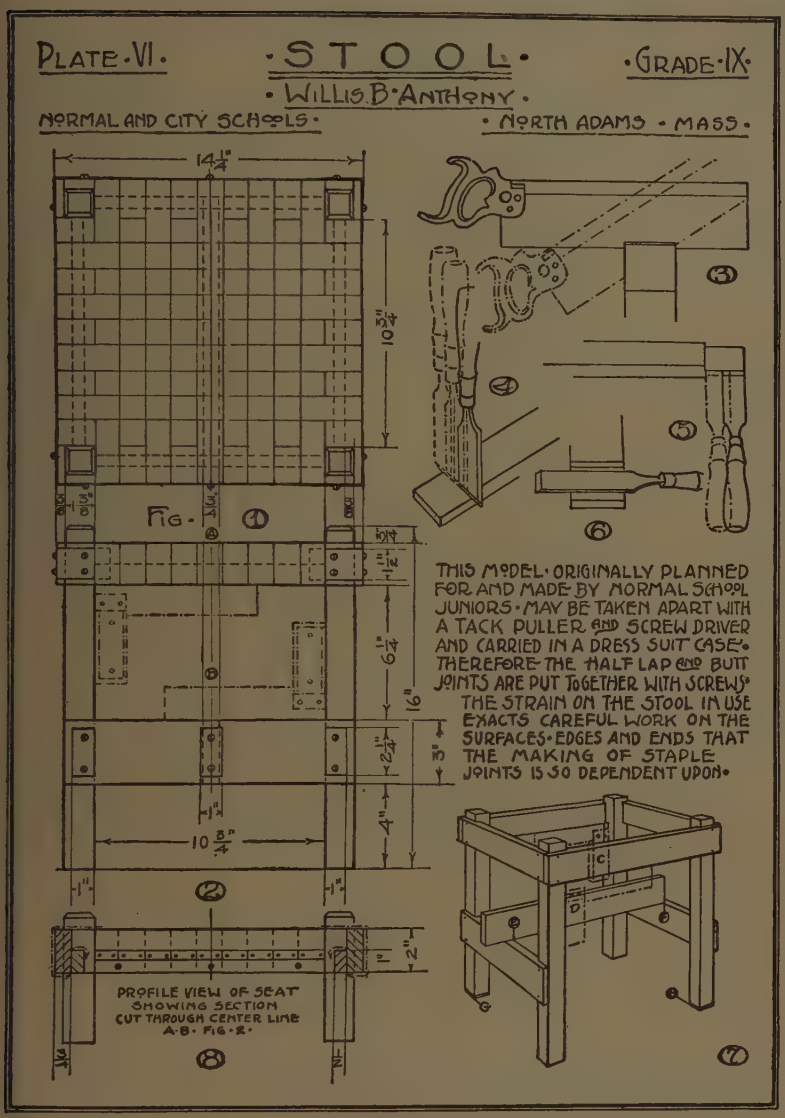
The horizontal lines naturally suggest horizontal borders, as seen in the picture. The lower margin should be wider than the upper, suggestive of the greater strength of a base. This brings the center of interest in the design a little above the geometric center of the strip. Avoid lines that abruptly intersect, as in the plain cross. Note how in the diagrams the lines of the leaf-shaped forms are gradually swung more and more parallel with the sides of the strip. Reasons for decorating it are set forth in the legend.



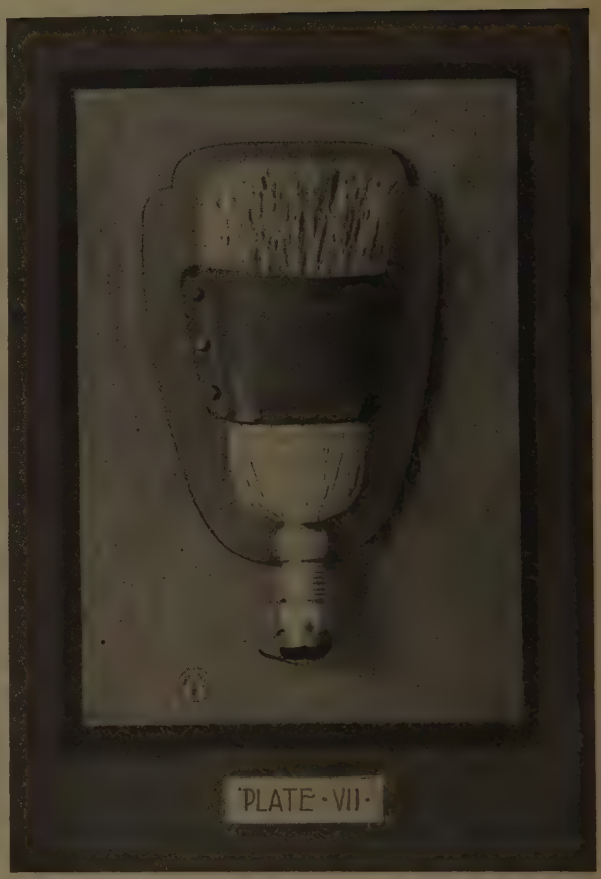
What a fine, old-country suggestion this STOOL gives! It is not a rush-bottomed stool, as one might think to look at the attractive picture of it, but the seat is a woven one made from rug binding. Of this material, the all-wool weave is best, as being more permanent. The frame should be of the best hard wood, for this stool is unusual in its construction. It is meant to be taken apart at will, and can be packed in a suit case. Its corners are furnished with broad brass strips that are not for ornamentation, but to act as washers under the screws which fasten together the corners. These screws might otherwise gradually "chew" into the wood and deface it, as well as thus weaken the corners.

The stool consists of the four legs; four upper or seat rails that brace the top and also hold the seat web; two lower rails; and, up under the seat web, two inner rails, screwed against the seat rails, to act as binders for the ends of the seat web. A cross brace stiffens the lower rails. But what a beautiful as well as useful thing it is, as it stands there, with the guitar and a bit of old woven fabric beyond it! It might well belong to some manor house of Elizabeth's day. The diagram views give you the dimensions, all of which have been worked out according to the rules of good constructive design. A stool has no back, so all sides should be alike, so far as fitness to purpose goes, though it is conceivable that a stool might be well designed, and yet show some variation in the pattern of its sides. Its height should be determined by the use it is put to; see what height of chair is most comfortable considering the natural bend of your knees when seated, and plan your stool accordingly. Allow for material, cushions, etc. Have the legs stout enough to allow for the heavy screws that enter them in several places at the corners so these will not collide in the wood.

The tops of the legs also may well rise a little way above the seat, because if they did not, there would be more likelihood of the corner joinery splitting them. The strips of web for the seat are fastened as seen in the lower left-hand corner of the plate opposite where the stool is shown in section; that is, as if it had been sawed in two across the middle. Here you will see a row of small dots, arranged in pairs between two horizontal lines. This is where the ends of the strips are tacked to the inner rail at the top of the stool. Look now at either


PLATE·VI· ·STOOL· ·GRADE·IX·
·WILLIS B·ANTHONY·
NORMAL AND CITY SCHOOLS· ·NORTH ADAMS · MASS·
FIG· ①
THIS MODEL·ORIGINALLY PLANNED FOR AND MADE BY NORMAL SCHOOL JUNIORS·MAY BE TAKEN APART WITH A TACK PULLER AND SCREW DRIVER AND CARRIED IN A DRESS SUIT CASE· THEREFORE THE HALF LAP AND BUTT JOINTS ARE PUT TOGETHER WITH SCREWS· THE STRAIN ON THE STOOL IN USE EXACTS CAREFUL WORK ON THE SURFACES·EDGES AND ENDS THAT THE MAKING OF STAPLE JOINTS IS SO DEPENDENT UPON·
PROFILE VIEW OF SEAT SHOWING SECTION CUT THROUGH CENTER LINE A·B· FIG·2·
⑧
⑦

side of this particular view, and you will see where the cross-lined sections show the inner and outer top or seat rails cut across. The ends of the strips (in this side, of course, weaving across the others) are tacked on the inside upper edge of the inside rail, are carried up over the top of it, and down between it and the outer rail, then under the outer rail, and up its outside and over the seat to the other side of the stool. Unlike the ordinary chair, this stool has but one brace. This is fitted tightly between the two lower rails. It is shown in process of joinery at the lower right hand. The rails are all cornered about the posts with the "lap-and-butt" joint, which is simply a part of the end of each rail cut out, so that the resulting shoulders butt against the legs, while the remaining half of the thickness of the rails is carried along beyond the legs and past the end of the next rail. When fitted the extra end is sawed off, making the outer corner true. Too much cannot be said for good workmanship on this stool; simple as it is, if these joints are not cut true, and as absolutely true as the human hand can do it, the work will soon show the effects of the poor cutting. To be sure, this only requires the drawing of each guide line well, or the cutting of each joint evenly; but these require care, patience and will. Chisels and saws do not run accurately of themselves, and we have to furnish that accuracy from brain, eye and hand. The try-square is shown in several places, in dotted line, where it is necessary that the most accurate right angles should be obtained. Round-headed screws are used in setting the corner joints, for even the extra amount of wood taken out of the tongues of the seat rails in countersinking for flat-headed screws would seriously weaken the joints. Use stained putty in the temporary nail holes and wherever needed. The finish of the wood should be in stain and shellac, rubbed down between coats, or a final rubbing with beeswax dissolved in turpentine. Clean the brass with turpentine and metal polish.



This BRUSH BROOM HOLDER is made attractive by the decorated leather band that holds the broom, and the well-designed wood panel of its back. This is fastened to the wall by two screws, set near the top and bottom, and hidden by the brush. The back is sawed out with the coping saw, and the leather is tooled with three tools made from wire nails. The diagrams show several working views, and the illustration the finished broom holder as it has been made many times by boys of grammar-school age. As to the diagram views: Figs. 1, 2, 3 show the top, the front and the side views, 4 and 5 show the wire nail tools, 6, 8 and 9 the development of the leather design, 7 this design in paper pattern, doubled, and 10 shows a practice pattern, with an edge view below it. This edge view indicates about how deep the tooling should go.

In tracing the pattern for the back panel on the wood, mark sharp penciled points on the pattern and also on the edges of the working surface where the edges of the pattern touch the edges and ends of the blank. See A, B, C, etc., Fig. 2. Stand the blank of wood vertically in the vise. Hold the try-square handle firmly against the flat surface of the wood, so that the blade rests squarely across the edge. See square so held in Fig. 3, dotted line.

Draw, for instance, a line along the blade of the try-square from A to A, as shown in Figs. 1 and 2. Find points B, C, H, etc., in same way. Then turn the blank upside down on the bench and with these points as guides lay the paper pattern down and thus duplicate it from the front side. From first to last, good joinery is a matter of simple care. To saw accurately, so as not to have to try and watch front and back at the same time, slant your saw and do all the cutting on one line — say on the front side — for ¼″. Then begin on the back side, and the slot of the front side will carry the blade straight while you are cutting true to the line on the back side. Thus swinging back and forth, you will have cut true to the guide lines on both sides of your wood.

The design on the leather should be first made to your satisfaction on paper, then traced with a hard pencil. Remove the paper and go over the lines again. Wet the leather with a rag but remove any actual water. With the burnished ends of the tools, carry the lines deeper, and slanting the tool gradually, mold and model the larger spaces from lowest to highest parts. The deeper a spot is modeled, the darker it dries out in color.

The tool for stamping the background is made from a tenpenny nail, squared at the end. The lines separating the spots from the background are pressed into the leather with the end of a long wire nail filed and ground as at J, Fig. 5. The spots are modeled in low relief with the other end of the wire nail, filed and ground like a very dull nut pick. See K, Fig. 5.

When you have worked out the design to your satisfaction, trim the leather to the final outside boundary lines, and wet and fold over the laps where the tacks are to go, setting them

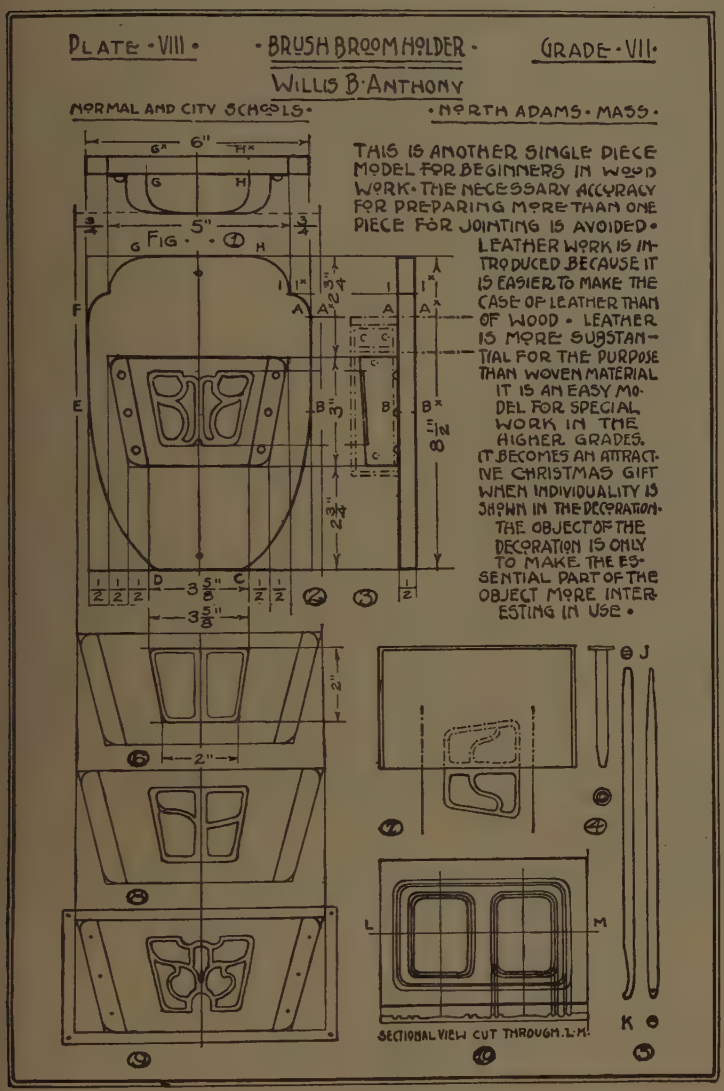
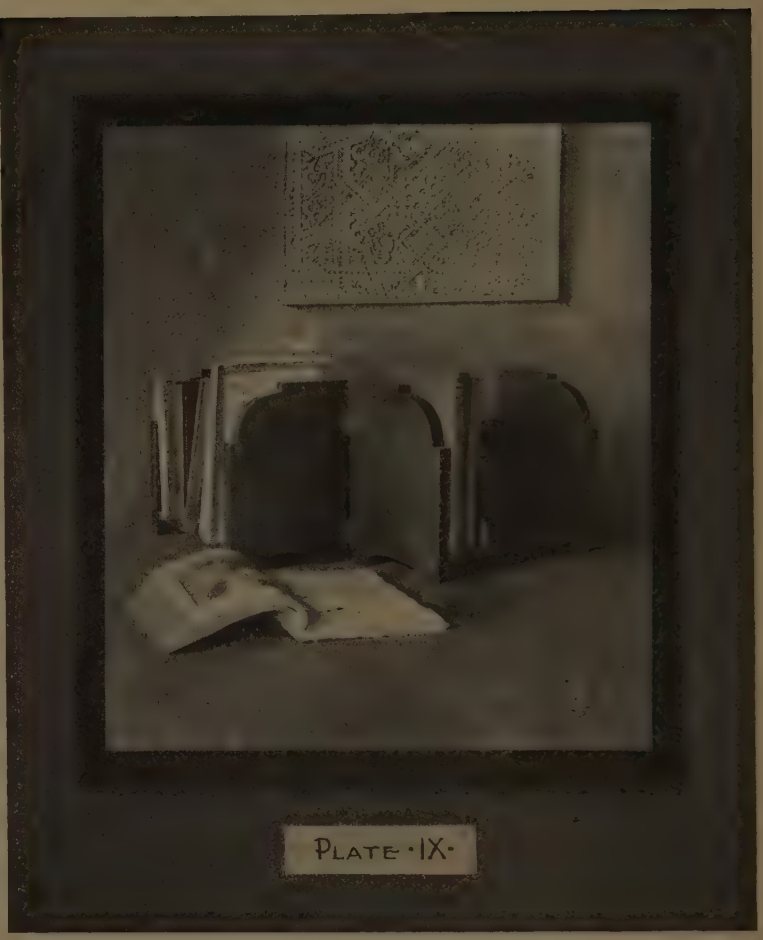


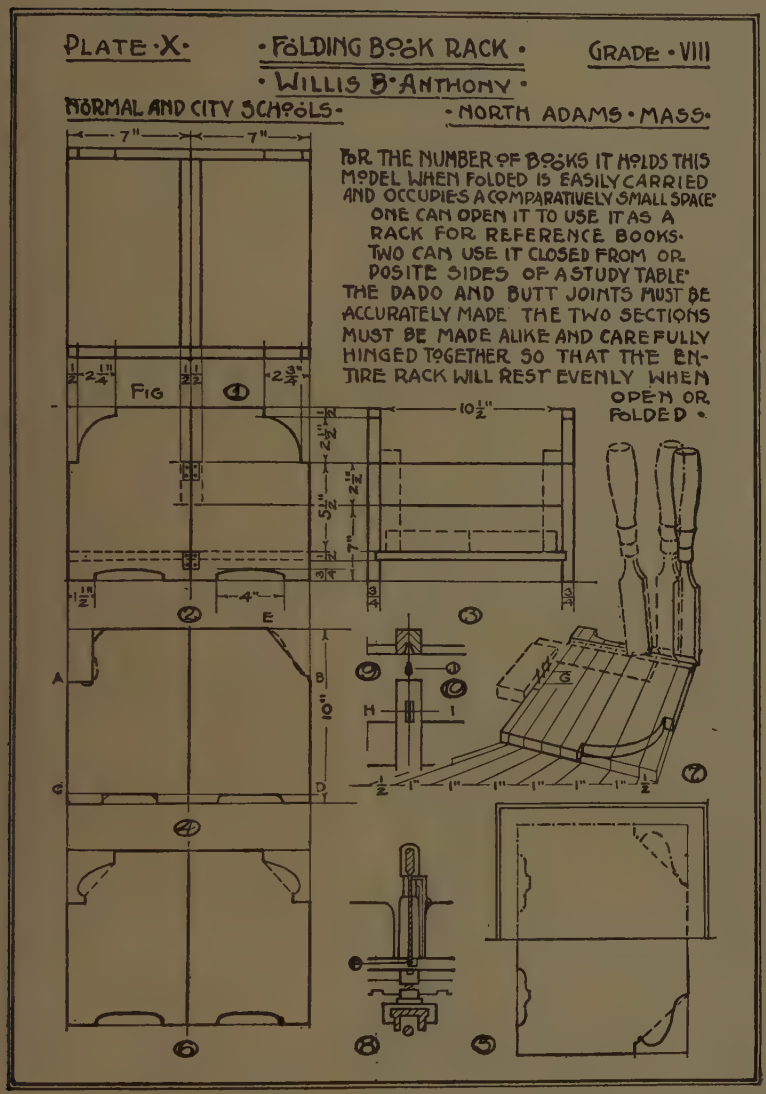
PLATE · VIII · · BRUSH BROOM HOLDER · GRADE · VII ·
WILLIS B. ANTHONY
NORMAL AND CITY SCHOOLS · · NORTH ADAMS · MASS ·
THIS IS ANOTHER SINGLE PIECE MODEL FOR BEGINNERS IN WOOD WORK · THE NECESSARY ACCURACY FOR PREPARING MORE THAN ONE PIECE FOR JOINTING IS AVOIDED · LEATHER WORK IS INTRODUCED BECAUSE IT IS EASIER TO MAKE THE CASE OF LEATHER THAN OF WOOD · LEATHER IS MORE SUBSTANTIAL FOR THE PURPOSE THAN WOVEN MATERIAL IT IS AN EASY MODEL FOR SPECIAL WORK IN THE HIGHER GRADES. IT BECOMES AN ATTRACTIVE CHRISTMAS GIFT WHEN INDIVIDUALITY IS SHOWN IN THE DECORATION · THE OBJECT OF THE DECORATION IS ONLY TO MAKE THE ESSENTIAL PART OF THE OBJECT MORE INTERESTING IN USE ·
FIG · ①
SECTIONAL VIEW CUT THROUGH L·M·

under pressure to dry. In fastening the leather band to the back panel, fit it rather tightly around the whisk broom, just so you can pull the broom through. Use large, flat-headed brass tacks long enough to clinch through the wood. As a lesson in structural design the principal thoughts of the designer are well set forth in the lettered portion of the diagram. The simple beauty of the object is apparent from the illustration on page 230. The use of the case determines its size and shape. The distance around the band is derived from the distance around the broom it is meant to hold. The design occupies the front rather than the sides, because the sides are not usually so much in evidence.

At the lower end it is but little larger than the same end of the broom. At the upper end it flares to correspond with the flare of the broom-ends, but still confines them so as to keep them from flattening out. This is one of the most practical reasons for a whisk-broom holder; otherwise a whisk broom is apt to wear out much sooner, as the spreading ends are more liable to break than when confined. Again, the pocket or band must be high enough to hold the broom upright; otherwise a mere strap would answer — after a fashion. Notice further that no curves are cut in the top or bottom edges of the band, as such would be apt to make it curl. The width of the laps, where the leather is tacked to the board, depends on the size of the large, washer-like heads of the tacks. Considerable strain, first and last, comes on these tacks, so that the laps have to be sufficiently wide. The curved upper and lower corners of the wood panel are suggested by the neighboring curves of the round heads of the tacks. As to the panel, it is long enough and wide enough to serve as a graceful background for the shape of the brush. The handle alone is not included in thinking out this panel, or better, it has been remembered that the handle should occupy a position by itself, and not be interfered with by the panel. You are apt — that is, *we* are — to get impatient after making more than one fruitless "grab" after a whisk-broom handle when the train we want is whistling. The whisk broom, like the tooth-brush, is pretty good evidence of the refinement of those who use it most.



This DOUBLE BOOK RACK is a step further in book-holder construction; it is so designed as really to be two separate racks, hinged at one end. For this reason it can be used either doubled up with the two backs together and so serve two students at once, or it can be opened and used as one continuous rack. The diagrams, page 233, require some explanation as to what they represent. At the upper right, Fig. 1, is a top or plan view of both racks swung back to back on their hinges. Below, at Fig. 2, is an end view of the same position. This also shows the brass hinges. To the right of this view, Fig. 3, is projected from it a side view, looking into one side of the empty rack. (The dotted lines are the try-squares placed to test.) Each of the two racks is simply made, of two ends or uprights, a shelf, jointed into the ends, and a stout slat, or stretcher, set between the ends, and against which the books rest their open sides. Figs. 4 and 6 are merely suggestions as to the designing and working out of different shapes for the ends. From Fig. 5 you can see how one half of a drawn paper pattern would look if doubled, by holding up on edge a piece of looking-glass. The double lines are the edges of the mirror, and the dotted lines are the reflection of the design on which it sits. Fig. 8 shows a section through a miter-box, explaining how the back-saw will cut accurately a groove for the joint of shelf and ends. Figs. 9 and 10 are plan and elevation of the hinges. Fig. 7 is left to the last in the description, as it refers more directly to the actual making of the rack. It shows one end of one of the racks laid down on its side, with the try-square at the left, in dotted line; this acts as a straight-edge for the point of the left-hand chisel, which is used to draw the lines for the grooves. The two chisels at the right, in dot-and-dash line and full line, merely show how to "lap" the strokes to make the best kind of cut. At G, on the left of this rack end, are shown three nails, where these should be drilled for, slanting the outside two so the nails will spread apart. They are to hold the ends of the stretcher, and the nails of course are to be driven from the outside of the rack end. The view of the actual book racks standing full of books on the table, shows the two hinged together, but swung out at about right angles to each other. The "dado" joint referred to in the lettered part of the diagram means simply the joining at the bottom


PLATE·X· ·FOLDING BOOK RACK· GRADE·VIII
·WILLIS B·ANTHONY·
NORMAL AND CITY SCHOOLS· ·NORTH ADAMS·MASS·
FOR THE NUMBER OF BOOKS IT HOLDS THIS MODEL WHEN FOLDED IS EASILY CARRIED AND OCCUPIES A COMPARATIVELY SMALL SPACE· ONE CAN OPEN IT TO USE IT AS A RACK FOR REFERENCE BOOKS· TWO CAN USE IT CLOSED FROM OPPOSITE SIDES OF A STUDY TABLE· THE DADO AND BUTT JOINTS MUST BE ACCURATELY MADE· THE TWO SECTIONS MUST BE MADE ALIKE· AND CAREFULLY HINGED TOGETHER SO THAT THE ENTIRE RACK WILL REST EVENLY WHEN OPEN OR FOLDED·
7" 7"
FIG ①
10½"
4"
E
A
B
C
D
10"
H
I
G
②
③
④
⑤
⑥
⑦
⑧

the grooved joint where the shelf fits into the rack ends. The term refers to the lower part of any upright surface, as the word "frieze" refers to the upper part. "Butt joints" means the ends of the two stretchers butting against the rack ends. The lines shown at Fig. 7, in perspective, marked each 1″ apart, merely suggest how to mark drill holes along the groove of the shelf joint (where the chisels stand) for the nails which will hold the shelf in position. In drawing any pattern line with the chisel against the blade of the try-square, hold the bevel of the chisel away from the blade and not towards it. The construction of this book rack is simple. Employ the paper pattern, once you have decided on your design, for the shape of the ends. Try it doubled by means of the mirror, to see how the two ends will look when the rack stands swung together. Cut the ornamental parts, the outer corners and the legs, carefully, according to the directions given for the brush holder, so that all edges may be smooth, all cuts made true. You cannot spend too much time in getting the lines accurately drawn on the wood blanks. The groove for the joint of shelf and ends may be done with the chisel by hand, or sawed in the miter-box if you have a true box. But remember to allow not only for the width of your saw blade, but also for the extra width of its teeth, which you know on all saws are filed and "set" to flare out a little wider than the thickness of the blade itself. In grooving by hand be sure that the chisel does not slant away from the vertical towards the groove. This groove must be lined out very accurately, both as to width and depth. If the miter-box is used, first learn its parts, and do not think because it is a machine it will work without your brains. All of the attention spread out over a longer hand-process must be concentrated to see that the machine does not work out of bounds. Nail all securely, fill nail-head holes with putty, and stain and wax to suit. Always try for a finish devoid of glaring "shine." A dull surface, smooth and soft to the touch, is best.

A JARDINIÈRE AND BOOK STAND. The combined uses of this work are seen better in the picture than in the diagram. For certain heavy books, not used as often as others, such a shelf is especially fit. The general thought of the designer is most interesting and is instructive to the builder. It is thus set forth: "The size and shape of the top are in keeping with its use. The length of the top is influenced by the length of the space occupied by the books. A jardinière being wider than most books, suggests the width of the top. A top thick enough to be substantially fastened to the standards, is heavy enough to hold the books and stiff enough to take hold of in carrying the occupied stand. The book shelf is long and wide enough to accommodate six or seven books of average size standing vertically. The shelf is thick enough to serve as a substantial brace between the standards or ends. Each end of the shelf is set into the standards with a "dap" joint. To secure greater strength two tenons at each end of the shelf extend through the standards. The width of the base of the standards is sufficient to prevent the stand from tipping. It repeats the width of the stand top, thus relating the bottom of the stand with its top. The upper ends of the standards are wide enough to keep the top from warping. They repeat the width of the shelf. A cleat is screwed to the top of each standard and to the top of the stand. The standards are long enough to raise the shelf a convenient distance from the floor, and the top a sufficient height above the books. The standards do not hold the jardinière an unsafe distance from the floor. It is held low enough to show the upper part and sides of the plant to best advantage. A curve is cut in each edge of the standards that the books crowded against them may be more easily reached. Part of the standard's base is cut away to make cleaning under the stand less difficult. The parts of the stand are the top, the two legs, sides or standards, and the shelf. It is interesting to learn, as stated above, that the curves in the sides of the standards are not for beauty in the first place, but for use, to facilitate the easy pulling

out of a book. Thus in good design is beauty made the handmaiden of utility. Either is forlorn without the other. Ugly usefulness does not attract. Useless beauty is pitiable. The working out of the details of this stand is very plainly shown by the diagrams. Fig. 3 shows the form of the book shelf, and its relation to the rest of the stand. It is not merely "let into" the standards at each end (see Fig. 2), but is also extended beyond them, by means of two tongues or tenons through mortises cut in the standards. The ends of these tenons are neatly beveled, and form an important part of the decoration of the whole. The final assembling is completed by nailing the parts together. You will learn much about the principles of construction involved in building the stand by studying Fig. 6. Notice that the inside of the standard base, the feet, in other words, is close to a vertical line dropped from the edges of the top of the standard. Even if the standards were merely vertical legs, like a bench, the proportion would be good, though it would have been a mere bench, and too top-heavy for a stand. But by widening the bases the extra stability is gained. Notice, further, the relative proportions of the three main horizontal divisions. These are good because they are pleasing and restful to the eye; and why? Because they are not exact multiples, though very near it. They do not announce their exact measurements or relations to each other at a glance. They leave something to stimulate the mind. Also, in the floral design, notice how the top is an exception to the parallel tendency of the sides and base. It relieves the severe lines by its curve. The same is true where lower lines are modified around the tenons. On the right-hand side of the center line of Fig. 6, is also shown the gradual development of the form of the decoration, following the changes made in the standard edges from straight lines to curved lines.

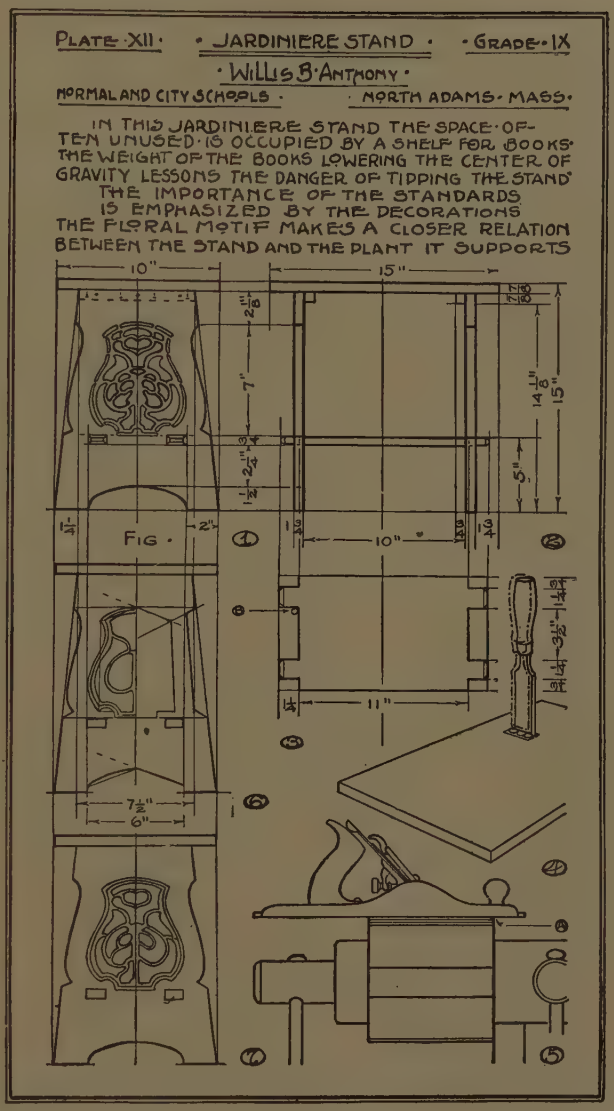
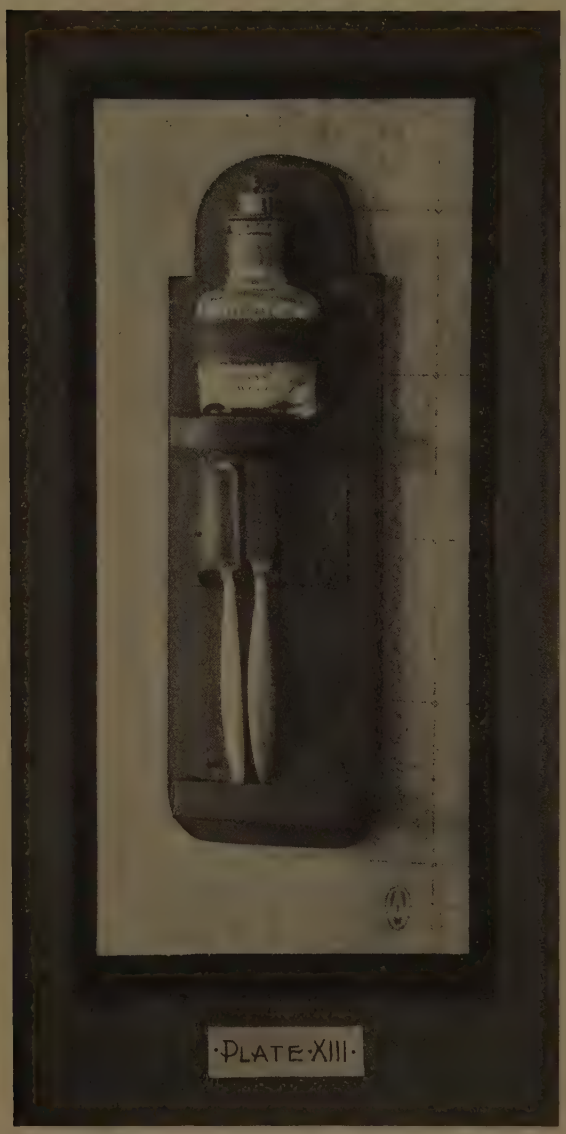


PLATE XII · JARDINIERE STAND · GRADE IX
WILLIS B. ANTHONY
NORMAL AND CITY SCHOOLS · NORTH ADAMS · MASS.
IN THIS JARDINIERE STAND THE SPACE OFTEN UNUSED IS OCCUPIED BY A SHELF FOR BOOKS THE WEIGHT OF THE BOOKS LOWERING THE CENTER OF GRAVITY LESSONS THE DANGER OF TIPPING THE STAND
THE IMPORTANCE OF THE STANDARDS IS EMPHASIZED BY THE DECORATIONS
THE FLORAL MOTIF MAKES A CLOSER RELATION BETWEEN THE STAND AND THE PLANT IT SUPPORTS
10"
15"
2½"
7"
2¼"
14½"
15"
5"
FIG.
2"
10"
11"
7½"
6"

Of the remaining views in diagram, the upright chisel shows how the mortise holes are started. After marking them out with great accuracy, bore three holes (working from both sides to avoid splintering) and thus do half the work for the chisel.

All structural openings such as the mortises should be worked out before the outer sawing is done, while the parts are still in the blank. This lessens the liability to split. Fig. 5 gives suggestion as to planing bevels upon wood held in the vise. Be sure and have a plane whose blade is of good metal or it will be a "thorn in the flesh."



A TOOTHBRUSH HOLDER. You can do the family no greater favor in the line of cleanliness than to present them with this little piece of bathroom or kitchen furniture. A toothbrush is a necessity; a toothbrush holder highly desirable. How often a tumbler is seen, a beclouded, gummy old glass with a gray film on the bottom, in which the family brushes are stacked without care, each rubbing against the other. Away with it! There are many shop-made holders, useful and beautiful, but we are going to make and add to our collection of beautiful home-made articles this one, in wood and copper. It consists of a panel of wood for the back which is fastened with screws to the wall, a wooden shelf with circular front for the bottle of tooth powder to stand on, a copper strap to keep the bottle from sliding off, a copper rack to hold the brushes, bristles upwards, and a little copper drip pan or box to catch any moisture that might drop off the brushes after rinsing. The diagram shows, at the upper left, a top or plan view, Fig. 1; below it the front view, Fig. 2; a side view at Fig. 3; the blank for the copper strip to hold the bottle, Fig. 10; the copper blank for the rack, Fig. 8; and the copper blank at Fig. 9 for the drip pan or box.

The lower figures, 4, 5, 6 and 7, refer to methods of working the different parts. These have been referred to in other parts of the book. (For instance, Fig. 6 shows a gauge held in process of making true the edges of the wall panel.) As usual, allow some extra stock all around the wood in order to have plenty of room to cut and finish the final outlines free from vise marks or dents in the edges. The holes in the rack are better made with a drill, but may be made by cutting in as far as the diameter of the circles, — using tinsmith's scissors, — then cutting off and rounding the inner half with a round file. Work long and patiently in finishing all edges of the metal parts with the flat file. Sandpaper the wooden parts just before assembling, after all your holes are drilled for the nails. Thus you will not run the risk of making new scratches or dents. The size of the strap or band that holds the bottle you must determine by whatever bottle you are likely to use. Do not have it tight, as your next bottle may be a trifle larger. It is to act as a guard, not as a socket. The smaller parts of an object are generally done first, that the larger pieces, when finished, will have less time to warp before putting the object together. With beginners, the larger pieces, which mean larger movements, and a developing control of the larger muscles, are done first. The rack, after drilling and finishing the holes, is to be bent so as to project outward and upward on the arc of a circle, as shown in Fig. 3. Here

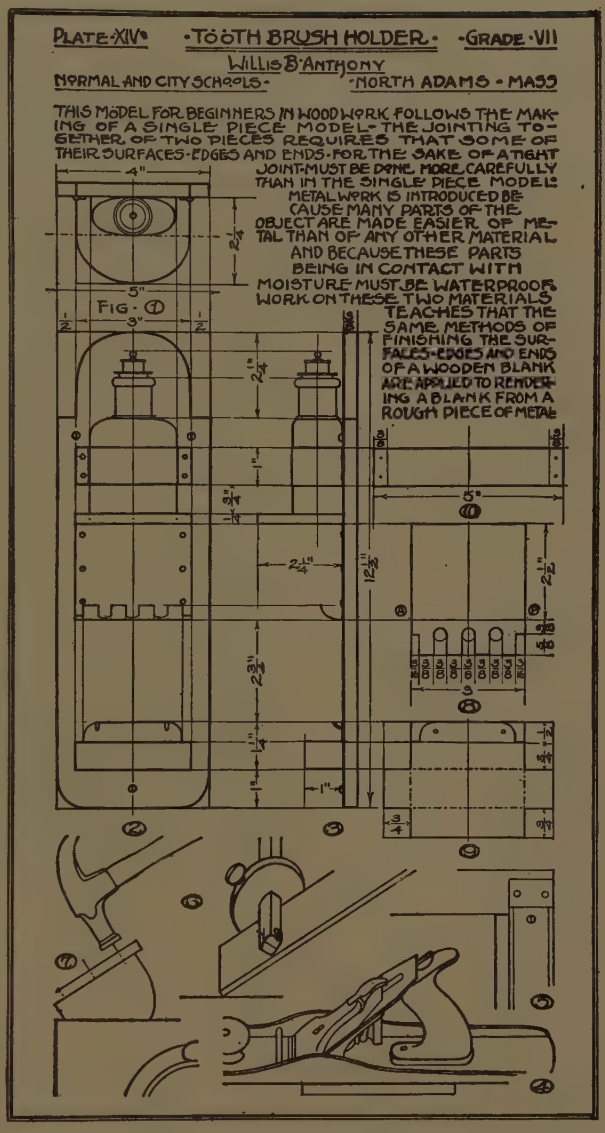


PLATE XIV • TOOTH BRUSH HOLDER • GRADE VII
WILLIS B. ANTHONY
NORMAL AND CITY SCHOOLS • NORTH ADAMS • MASS
THIS MODEL FOR BEGINNERS IN WOOD WORK FOLLOWS THE MAKING OF A SINGLE PIECE MODEL - THE JOINTING TOGETHER OF TWO PIECES REQUIRES THAT SOME OF THEIR SURFACES - EDGES AND ENDS - FOR THE SAKE OF A TIGHT JOINT - MUST BE DONE MORE CAREFULLY THAN IN THE SINGLE PIECE MODEL
METAL WORK IS INTRODUCED BECAUSE MANY PARTS OF THE OBJECT ARE MADE EASIER OF METAL THAN OF ANY OTHER MATERIAL AND BECAUSE THESE PARTS BEING IN CONTACT WITH MOISTURE MUST BE WATERPROOF
WORK ON THESE TWO MATERIALS TEACHES THAT THE SAME METHODS OF FINISHING THE SURFACES - EDGES AND ENDS OF A WOODEN BLANK ARE APPLIED TO RENDERING A BLANK FROM A ROUGH PIECE OF METAL
FIG. 1
4"
5"
3"
2¼"
2½"
1"
5"
12½"
23½"

also is seen the proper curve at which to bend the two copper hooks on which the drip box is to be hung. These are made of two copper tacks with the heads cut off after driving in far enough, and then bending upwards as shown. The box slips over these by two holes. The curve of the rack ends may be made by first bending to the straight line shown under A–B, in Fig. 8, over the vise-jaw, and then over a small dowel held on the vise, tapping gently with the hammer and gradually smoothing out all dents. Fill all nail holes left after setting the nails, with stained putty. Sandpaper finally, but be careful not to draw even the finest sandpaper crossway of the grain. Finish this holder with a stain darker in tone and duller in color than the copper. The screws, which fasten the holder to the wall, are set, one on either side of the bottle, and one beneath the drip box. As copper screws are not obtainable, and brass is the wrong color, select either blued finish or plain, round-headed screws and blacken them. Clean the metal with an emery eraser and shine it with a metal polish. After twenty-four hours rub with wax and polish with fine waste. In structural design the conditions should largely determine the construction. In this case the width of the heads of three brushes held far enough apart to be easily handled suggests the width of the brush holder or rack. It is long enough to include the hooks and the backpiece, which extends upward to the shelf to protect the wood from the moisture of the bristles. This strip should be at least as thick as 23-gauge copper, that the hooks may be rigid. The drip box should be wide enough to catch all drippings from curved handles bending outward to either side. It should be deep enough from front to back to allow for any frontward curve of handles. To protect the panel from wet ends of shorter handles, its panel side, or back, is higher than its front. The shape of its back suggests that of the top of the wood panel, thus bringing into unity the top and bottom of the object. Each part appears even at first sight to go well with the other parts. No bracket is used with the shelf, as there is not enough strain to demand one. The shelf is placed at the top of the piece of metal which forms the hooks or rack behind the brushes, and high enough above them not to interfere with the handling of them. The metal band that holds the bottle is high enough above the shelf to allow of cleaning the shelf. The panel is suited to what it supports.

A WASTE BOX. This useful article is made of hard wood, on account of the severe tax often put upon a waste holder of any sort. It is sometimes literally kicked around, not from any disorderly impulse, but by accident. It therefore becomes easily marred, and if made of soft wood soon gets to look worn unless great care is exercised. This one is constructed of four uprights or corner pieces, eight cross-pieces or stretchers, and four extra pieces or strips fastened inside at the bottom to help hold that in place. The four sides are filled with panels made of four pieces of heavy cardboard covered outside with burlap glued on, and inside with dull-surfaced paper pasted on. It is finally treated inside with spar varnish, which is waterproof and protects the box against apple cores and other wet refuse, which, by the way, it never ought to contain. You will notice that the uprights are not simple square-sawed pieces, but are cornered on the inside, or rabbeted, as it is termed. This you can do by means of the regular rabbet plane, but this is difficult to handle except by an expert joiner, and it is much easier and just as strong if you use two pieces glued and nailed together. This method is shown in end view in Figs. 4 and 5. Fig. 4 shows the relations of the two parts, Fig. 5 with the parts joined. This rabbeted corner allows for a better mortising of the stretchers to the uprights than a plain corner would. If the upright were a plain square stick, there would not be enough depth to allow of a very long tenon or tongue on the stretchers. Fig. 1 is a top or plan view, Fig. 2 a side view, Fig. 6 shows how the burlap is fitted over the cardboard side panels by a squared lap at the long sides, and a beveled lap at top and bottom; Fig. 12 shows the completed decoration as related to the center line, Figs. 10 and 11 show the frame in position for final planing. Fig. 7 shows how to use the gauge in marking off the tenons for the mortises, before the wide and narrow stretchers (upper and lower) have been ripsawed apart. Fig. 8 shows a Sheldon rabbet plane smoothing off one of the tenons. Fig. 3 shows the boring of a hole to start a mortise with a hollow block of given length strung upon the bit, so the hole will be bored only to a certain depth. Fig. 9 shows a section (one end) of the upright with the chisel held to start the mortise. The two parts of each upright should be glued, clamped, and then nailed to insure a perfect joint. A hint as to making a mortise may well be given here; for a mortise is to wood work what your joints are to you. Without mortises, few pieces of joinery would hold together and stand any strain.

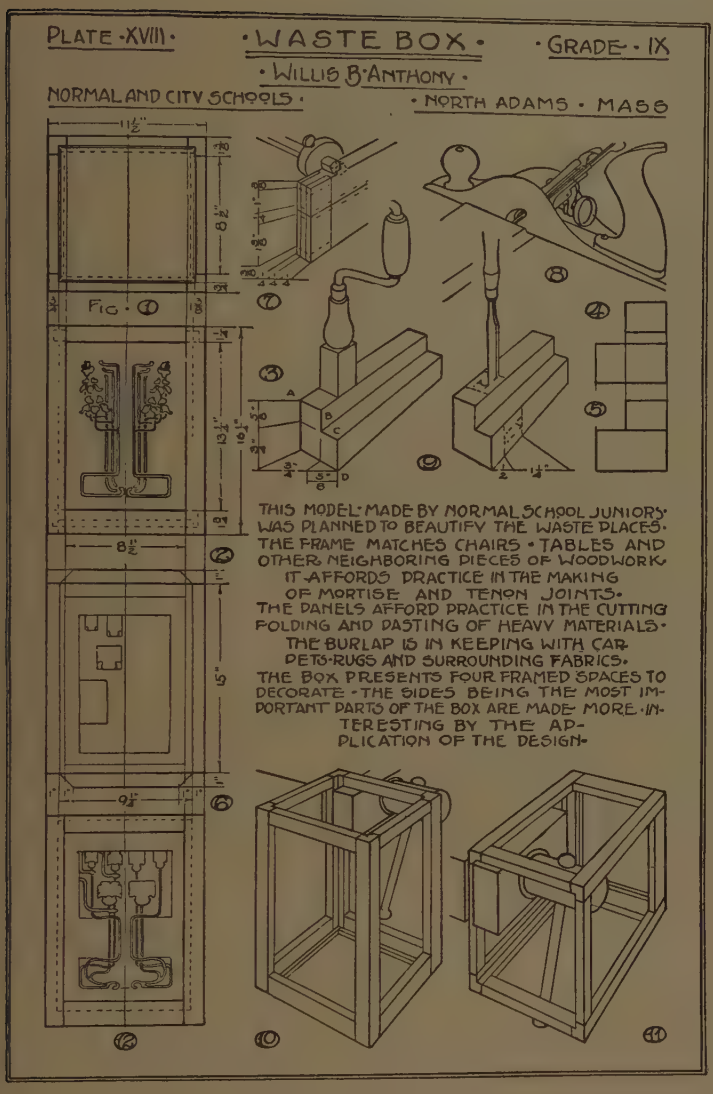


PLATE · XVIII ·
· WASTE BOX ·
· GRADE · IX
· WILLIS B. ANTHONY ·
NORMAL AND CITY SCHOOLS ·
· NORTH ADAMS · MASS
FIG · 1
THIS MODEL MADE BY NORMAL SCHOOL JUNIORS WAS PLANNED TO BEAUTIFY THE WASTE PLACES. THE FRAME MATCHES CHAIRS · TABLES AND OTHER NEIGHBORING PIECES OF WOODWORK. IT AFFORDS PRACTICE IN THE MAKING OF MORTISE AND TENON JOINTS. THE PANELS AFFORD PRACTICE IN THE CUTTING FOLDING AND PASTING OF HEAVY MATERIALS. THE BURLAP IS IN KEEPING WITH CARPETS · RUGS AND SURROUNDING FABRICS. THE BOX PRESENTS FOUR FRAMED SPACES TO DECORATE · THE SIDES BEING THE MOST IMPORTANT PARTS OF THE BOX ARE MADE MORE INTERESTING BY THE APPLICATION OF THE DESIGN.

Following the figured dimensions shown in the diagrams and drawings, you will find the upper mortise to be 1¾″ long by ¼″ wide. For this it is well to use wholly the ¼″ chisel. After boring the hole to start the opening, work back from the hole towards each end of the mortise lines, and in so doing your chisel, held crosswise of the narrow opening, trims its own way, so that the long sides ought to require no smoothing afterwards. If you try to trim them, you are sure to enlarge the hole so that the joint will look bad. In chiseling out this or any mortise, first bore a hole in the center and work the chips towards it. Never pry against the end of the mortise. Urge or draw the chip towards the hole. Slant the chisel over the mortise somewhat, in making the deeper cuttings, so that you will make it a little wider — a very little only — at bottom than at top. This will give room for the better fitting in of the tenon. When there is danger of the too-large tenon cracking the edges of the mortise, pare it slightly. Saw the tenon ⅛″ shorter than the depth of the mortise. Number each mortise and its tenon in a work like this, where there are several alike. Probably no joiner ever made them just alike. Test the joints with the try-square. If the uprights are not perfectly square with the stretchers, then the distance between the shoulders of the stretchers or the distance between the mortises are not exactly alike. The mistakes must be found and corrected. Put the joints together with glue. Pin them also with shingle nails, sheared to a pointed length ⅛″ less than the wood they are to enter. Drive from the inside. In finish-planing the tops of the uprights, rotate the plane with a scouring motion, so as not to chip or split them. Round the edges with sandpaper and the long edges with the plane. The bottom board rests down on the supporting strips, and should be nailed slantingly through into the lower stretchers. The decoration is done in oil colors on the burlap. It may be stenciled. The inside of the panels should be stained before varnishing. Fasten in the panels with copper tacks, six at top, three at bottom, and two on each side, but not until the decorations are thoroughly dry. Place soft pads under the frame, to prevent scratching its finish. Partially remove the stain from the tack heads, letting the color of the copper shine through.

A HAT RACK. The picture shows perfectly how the hats are lightly held at the top of the rack. The diagram explains the construction. Fig. 1 is the plan view, from the top; Fig. 2 is the front view, and Fig. 3 the side or end view. The rack is held to the wall by screws, one set through the lower end of each upright piece, and one through its upper end where the strip of metal forming the upper brace for the hat rod is turned back against it. It is made of five wood parts: two uprights, two cross-pieces or stretchers, and a rod. The lower stretcher is wider than the upper. The small square rod is set upon brackets $2\frac{1}{2}''$ out from the main structure, and its own thickness above it. This supplies a rest for the hats, whose rims are set below the upper stretcher, and are thus held, as shown in side view, Fig. 3. The brackets are made of strips of 18-gauge brass. Five hooks, made by hand from brass wire, are for hanging the clothes, the two on the ends also serving to hold in place the lower bracket that supports the hat rod. The under edge of the upper stretcher and the two upper edges of the rod are beveled so that they will not chafe and wear the hat brims. As to construction: The lower stretcher is $3\frac{1}{4}''$ wide, while the upper is only an inch. The lower is fitted to the back of the uprights by a half-lap joint, shown at Fig. 5. The upper stretcher is fitted to the uprights by a rabbeted joint, the stretcher being rabbeted over or across the top of the upright. It is therefore longer than the lower stretcher. Fig. 6 is the brass plate which acts as a washer back of each brass hook. Fig. 9 shows a front and side view of the clothes hook hammered out ready for bending; Figs. 10 and 11 show the stock for the brass braces or brackets ready to bend and fit, and Figs. 7 and 8 show steps in the process of bending the clothes hooks into shape. Fig. 4 refers to the tendency of a saw to run off the line it is meant to follow, which will be referred to again. In getting out the stock it is well always to cut as many of the simpler parts out of one piece as possible, and at the same time. For instance: the two stretchers may be cut from one board as follows:

Rough out the piece $\frac{1}{2}''$ wider than the combined width of the two stretchers, and $\frac{1}{2}''$ longer than the longer one. This will make the whole width of the board: wide stretcher, $3\frac{1}{4}''$, + width of narrower stretcher, $1''$, + $\frac{1}{2}''$ allowance for working; total, $4\frac{3}{4}''$. Plane smooth the surface and plane true the two edges. For the present never mind the ends. Plane down the edges thus $\frac{1}{8}''$ each, and then with your gauge mark inward from each edge the respective widths of the wide and narrow

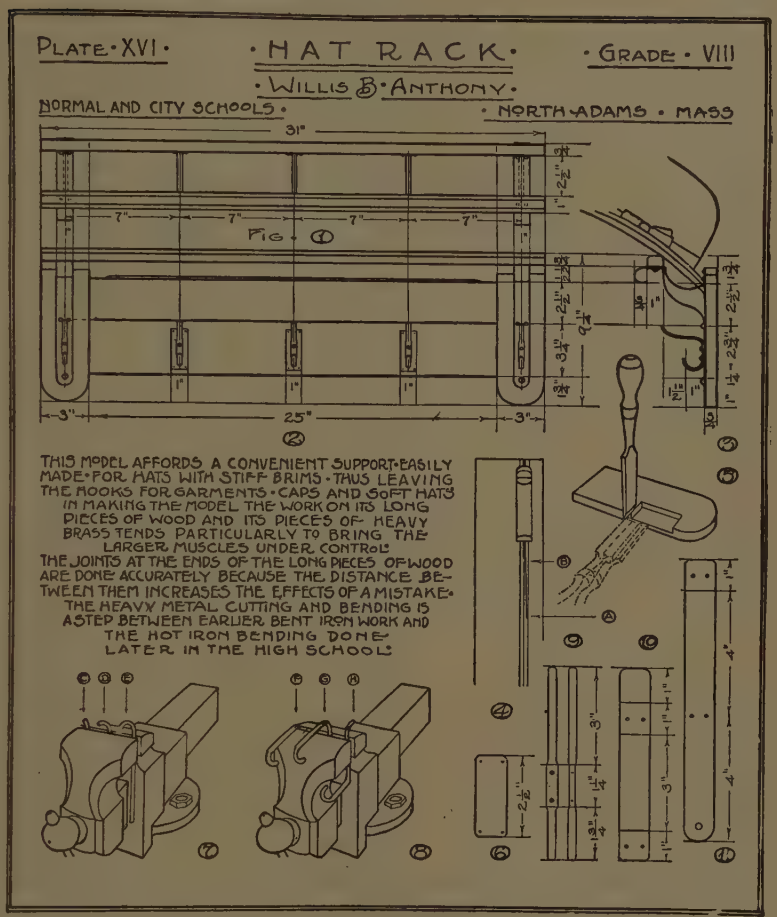
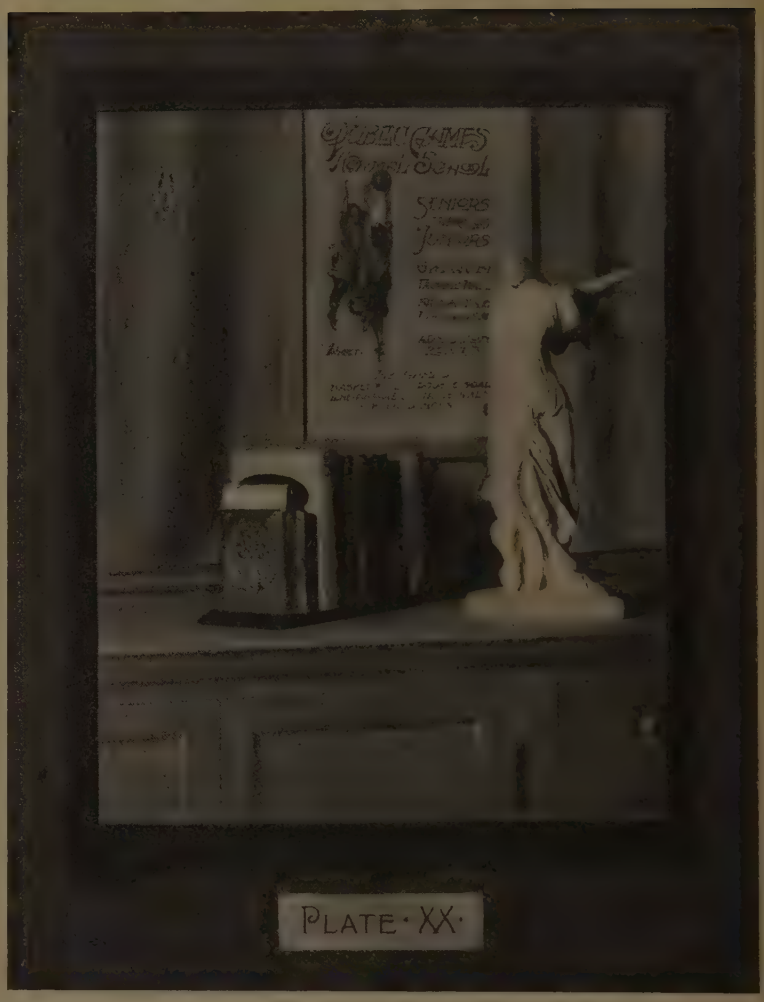


PLATE · XVI ·
· HAT RACK ·
· GRADE · VIII
· WILLIS B · ANTHONY ·
NORMAL AND CITY SCHOOLS ·
· NORTH ADAMS · MASS
31"
7"
7"
7"
7"
FIG · 1
25"
3"
3"
THIS MODEL AFFORDS A CONVENIENT SUPPORT · EASILY MADE · FOR HATS WITH STIFF BRIMS · THUS LEAVING THE HOOKS FOR GARMENTS · CAPS AND SOFT HATS IN MAKING THE MODEL THE WORK ON ITS LONG PIECES OF WOOD AND ITS PIECES OF HEAVY BRASS TENDS PARTICULARLY TO BRING THE LARGER MUSCLES UNDER CONTROL
THE JOINTS AT THE ENDS OF THE LONG PIECES OF WOOD ARE DONE ACCURATELY BECAUSE THE DISTANCE BETWEEN THEM INCREASES THE EFFECTS OF A MISTAKE · THE HEAVY METAL CUTTING AND BENDING IS A STEP BETWEEN EARLIER BENT IRON WORK AND THE HOT IRON BENDING DONE LATER IN THE HIGH SCHOOL

stretchers. This you will find will leave between a space ¼″ wide, and here you are to ripsaw the two stretchers apart. You might follow the same method with more pieces to be gotten out of any one board. Your stock in this case is ¾″ thick; see Fig. 3. In sawing the stretchers apart with the ripsaw (a splitting saw) you are apt to meet with the trouble suggested by Fig. 4, that of the saw going off the line. You should first mark a center line to follow, as shown in the diagram; when you find you are off the track, do not try to twist the saw and so get gradually back to the line, but withdraw it to the place where it began to slant off, and carefully follow the "kerf" or cut down true. Makeshifts at any step are apt to cause trouble. In any joint that requires mortising or setting-in as in Fig. 5, remember not to cut on the lines at first, but to cut out the wood to the needed depth in the center. This will give you a space into which to draw or scrape the chips you cut when you do work finally to the exact lines. You will thus not need to pry or brace against the edges of the mortise or cut. Never do this. The making of the brass hooks is a most interesting piece of handiwork. It involves the beating out of metal, the ancient form of working it, before Man had discovered its relation to heat. Such, no doubt, was the method first followed by Tubal-Cain and his stanch old associates mentioned or referred to in that splendid Fourth Chapter of Genesis in your Bible. Rough out the wire ¼″ longer than is shown at Fig. 9, filing or cutting it with the cold chisel. File the ends round and smooth to the touch. Mark off the middle part for the screws, and then beat it out neat and flat on an anvil or flat piece of iron. This will afford you great satisfaction, bending stubborn metal to your will. Its final manipulation in the vise is fully shown in the diagram. In bending the brackets, use a paper pattern on which you lay the brass edgewise, and do the final bending over a vise-handle or mallet head. Perhaps you have a better design for the curves than is shown here. The oblong brass washer-plates for each hook are held with round-headed brass tacks. All screw-holes in hooks and brackets are drilled. Set all screws so the slot will show vertical. Stain and finish the woodwork as you see fit. A good finish would be a brown stain. After 24 hours wax and shine it with waste.



ADJUSTABLE LETTER AND BOOK RACK. In making this rack you will have to exercise considerable creative thought; that is, you must be able to see a mental picture of it before you put it upon paper. It is another step ahead in contrivance and joinery. As seen in the picture, it appears like some of the other book racks heretofore described; but in addition it has a metal pocket on the outside of each end, for holding letters. Its chief difference, however, is that its base slides apart, on the principle of an extension dining table, though it is nowhere nearly so complicated. To think it out, you must be able to see it as an oblong strip for the bottom, with each end inclosed by a piece shaped like a squared staple. When it is shut up to its shortest length as a book rack, these staple-shaped pieces meet each other at the sides, so that the whole base appears as one solid oblong. In sliding apart or together, the long parts of the ends are tongued on their inner sides to run in grooves cut on each outer side of the main base panel. To prevent the ends from pulling quite apart from the main base, a metal guard, which is oblong with a slot running along the middle, is fastened to each end piece by two screws. A screw is set through this slot into each end of the main base, and secures them from pulling quite away.

The ends are mortised to receive the uprights which are tenoned to fit them. The uprights are finally glued and then nailed into the ends of the base. Drive three nails into each upright, the middle one vertically, the two outer nails slanting towards the middle nail. Set the nails, and fill the holes. In constructing this rack each end is made of three pieces, the middle, which is simply a cut-off section of the main base panel, and the two side parts of each end, those which are tongued to slide on the main base panel. Therefore it is well to get out these two middle pieces and the main base panel in one piece of stock, and have them grooved all at once. The grooving is done with a kind of plane called a plow, or you can get it done at the woodworking mill. The main base panel is $7\frac{1}{2}''$ long and the middle piece of each end adds to this $3\frac{7}{8}''$ at each end. When grooved, saw apart, using the miter-box if you have one. Allow $\frac{1}{4}''$ for finishing. The two outside pieces of each end, four in all,

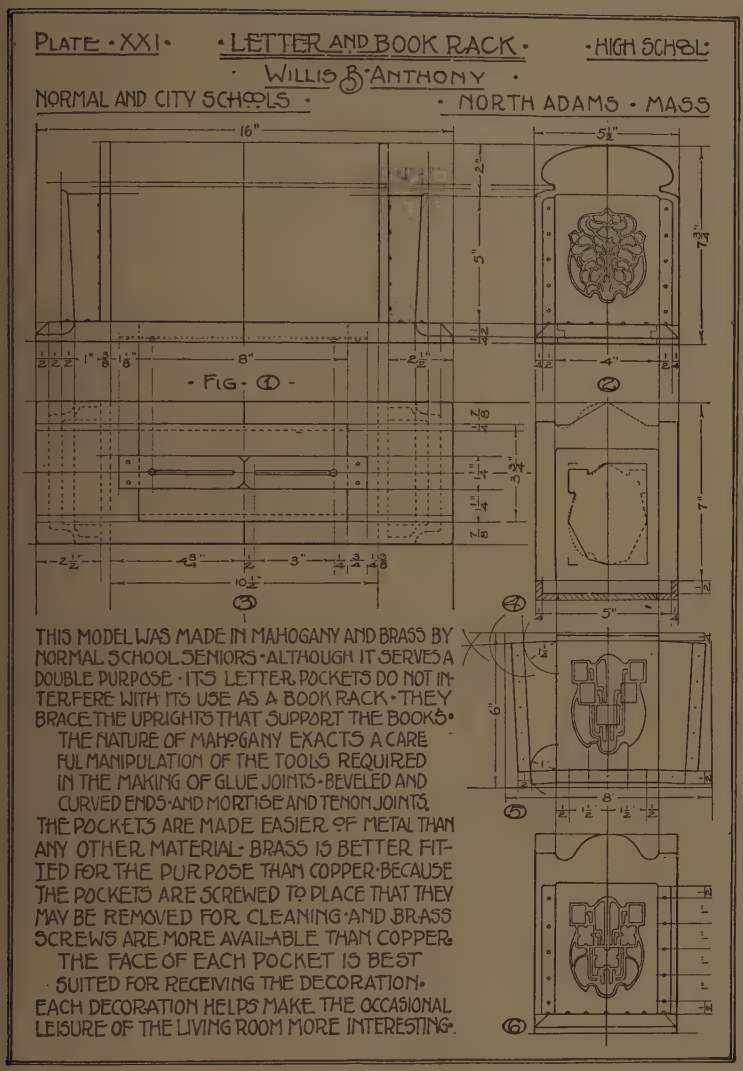
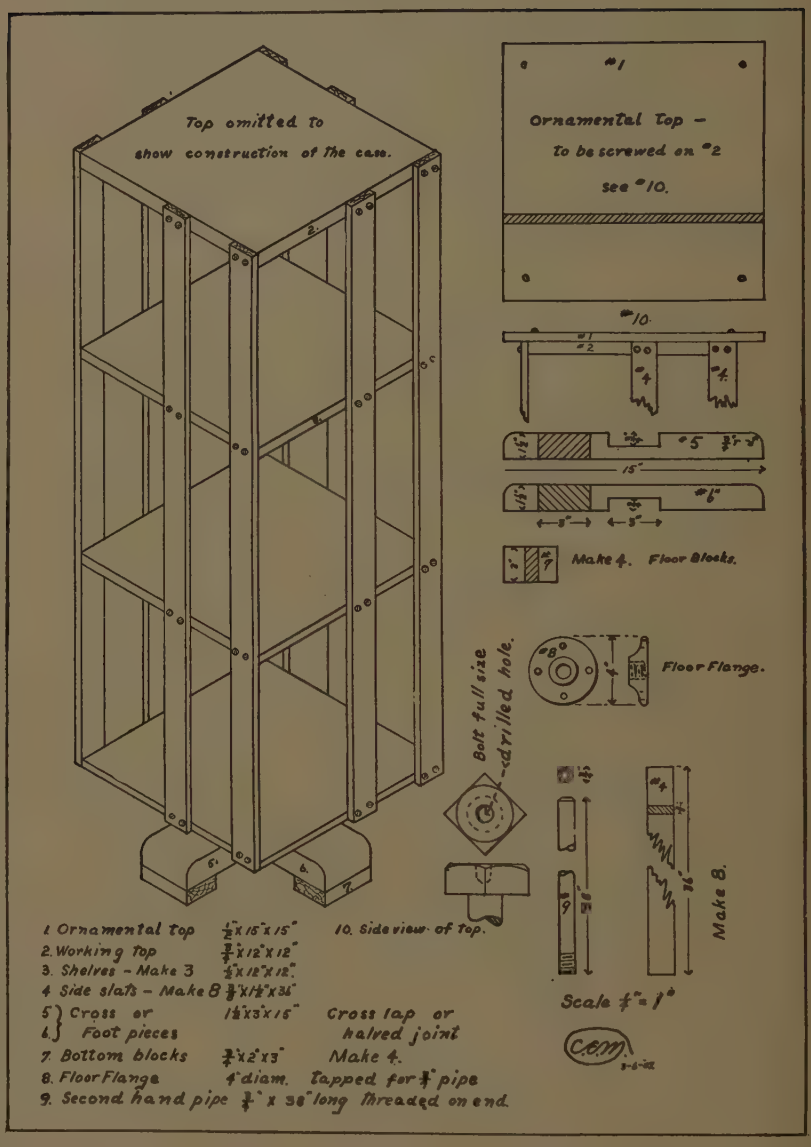


PLATE · XXI · · LETTER AND BOOK RACK · · HIGH SCHOL ·
WILLIS B. ANTHONY
NORMAL AND CITY SCHOOLS · · NORTH ADAMS · MASS
16"
5½"
8"
4"
- FIG. 1 -
5"
7"
10½"
THIS MODEL WAS MADE IN MAHOGANY AND BRASS BY NORMAL SCHOOL SENIORS · ALTHOUGH IT SERVES A DOUBLE PURPOSE · ITS LETTER POCKETS DO NOT INTERFERE WITH ITS USE AS A BOOK RACK · THEY BRACE THE UPRIGHTS THAT SUPPORT THE BOOKS ·
THE NATURE OF MAHOGANY EXACTS A CAREFUL MANIPULATION OF THE TOOLS REQUIRED IN THE MAKING OF GLUE JOINTS · BEVELED AND CURVED ENDS · AND MORTISE AND TENON JOINTS.
THE POCKETS ARE MADE EASIER OF METAL THAN ANY OTHER MATERIAL · BRASS IS BETTER FITTED FOR THE PURPOSE THAN COPPER · BECAUSE THE POCKETS ARE SCREWED TO PLACE THAT THEY MAY BE REMOVED FOR CLEANING · AND BRASS SCREWS ARE MORE AVAILABLE THAN COPPER.
THE FACE OF EACH POCKET IS BEST SUITED FOR RECEIVING THE DECORATION.
EACH DECORATION HELPS MAKE THE OCCASIONAL LEISURE OF THE LIVING ROOM MORE INTERESTING.

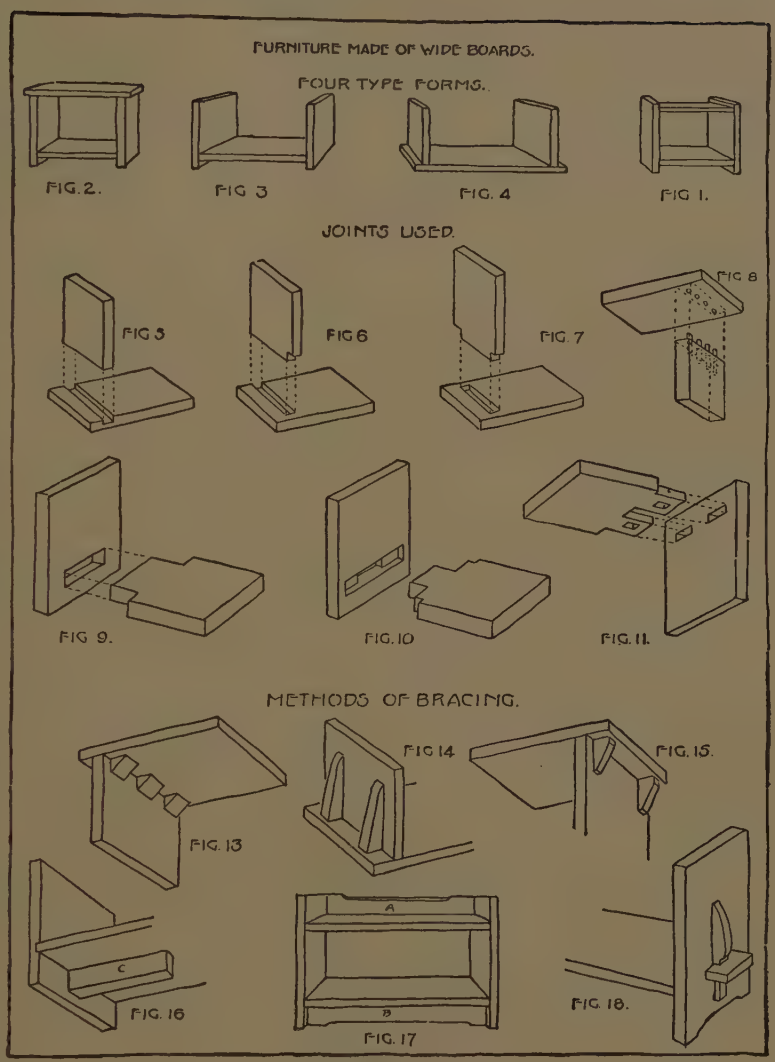
may be cut from one piece, one side of which is rabbeted to fit the grooves on the main base panel. Lay these four parts finally so that whichever surface of the stock you select for the working surface, will allow the grain of all four to run the same way. Fit the two end center pieces between their two respective side pieces. Be certain that the ends of the center pieces will butt close to the main base panel, and that the four outside pieces of each end will butt firmly together when the whole base is closed up, before you fasten together the three pieces of each end. The two metal guards or slides on the bottom must be countersunk flush with the bottoms of the three pieces they engage. The mortises and tenons you should be able to cut if you have followed these problems from the first. Absolute accuracy is the only ideal. The try-square must be at hand at all times. For the shape of the ends make your own choice. For the letter pockets the shape of the blanks is shown at Fig. 5. Fig. 2 shows it attached to the uprights. It is cut from 23-gauge brass. The guards are of 20-gauge. The pattern is made by stamping down the background.

The problem in making such a pattern is to skillfully proportion the amount of background to the amount of motif. The problem in applying it is to make the dents so regular in shape and so evenly spaced that the dents, and consequently the means of applying the design, will attract the least possible attention. Select a plant whose flower has a vertical face which is seen to best advantage on a table-top level; or one which has parts that group closely together, and so suggest the compact contents of the letter box in use. The pansy, apple blossom, nasturtium and sweet pea are among those appropriate. To make the background of unobtrusive interest, the nail you use for a punch should be filed to a circular or square form, so as to make a dent of that shape. These regular shapes are of less attractive power than elliptical, oval, oblong or triangular dents. As far as possible, the space between each dent should in this case be the same. Half the width of the dent is an uninteresting space between the dents. Each dent should be driven to the same depth. In drawing a design to cover such spaces, always work upon a vertical center line.

A REVOLVING BOOKCASE. You can make this with a saw, a plane, a screwdriver, and a chisel or jackknife. It consists of the foot or base, made of two pieces, Figs. 5 and 6, halved together as shown, into which is screwed an upright of pipe for the bookcase to revolve on. This pipe ends against the under side of the top, into which it is set a little distance. The diagram shows perfectly how the bookcase is made, and as a further help a number identifies every part. For the pipe-axis to screw into, on the two foot-pieces, a ready-made flange, Fig. 8, is best; but if you cannot buy one, nor get any pipe, find two circular boards about 8″ in diameter, nail them together and bore a hole in their center a trifle smaller than a broomstick. Then screw this wooden circular base to the foot pieces, and drive the broomstick into the hole. It will not be quite as rigid as the pipe and flange, but it will do the work. If you can get the iron fittings, however, ask for 38″ of old ¾″ water pipe; defective pipe will answer. Ask for "one 4″ floor-flange for a ¾″ pipe."

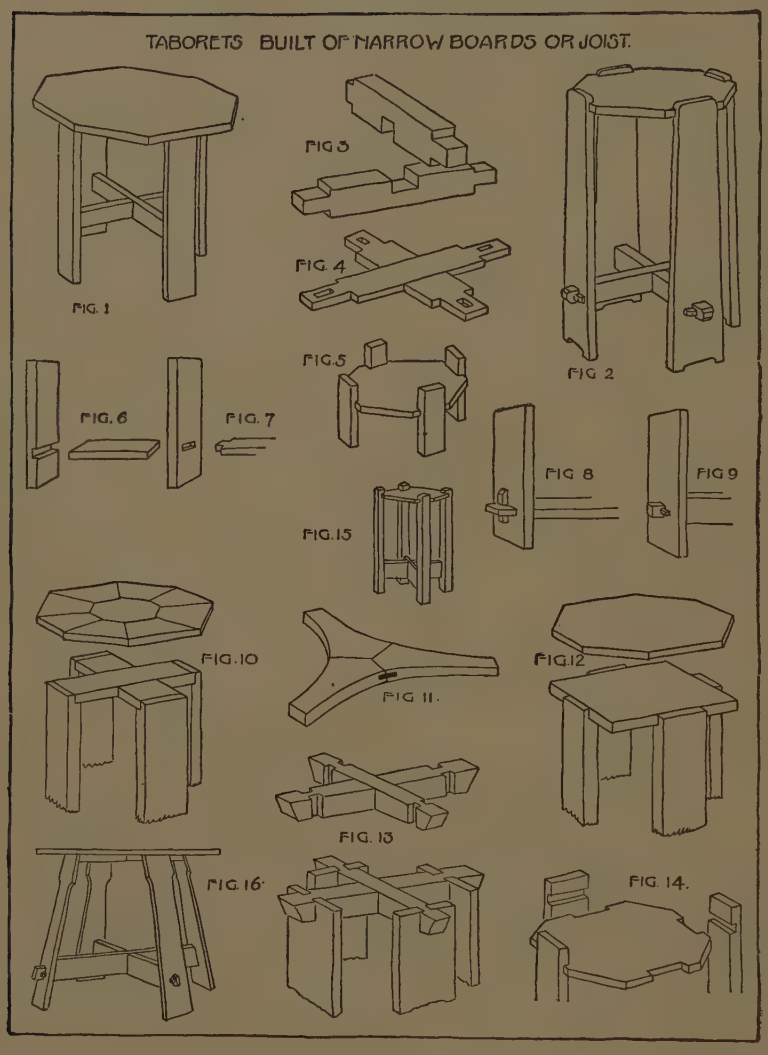

Top omitted to show construction of the case.
#1
Ornamental Top — To be screwed on #2 see #10.
#10.
Make 4. Floor Blocks.
Floor Flange.
Bolt full size -drilled hole.
Make 8.
Scale ½" = 1"
1. Ornamental top ½"x15"x15"
2. Working top ¾"x12"x12"
3. Shelves - Make 3 ¾"x12"x12"
4. Side slats - Make 8 ¾"x1½"x36"
5. } Cross or
6. } Foot pieces 1¼"x3"x15"
7. Bottom blocks ¾"x2"x3"
8. Floor Flange 4" diam.
9. Second hand pipe ¾" x 38" long threaded on end.
10. Side view of top.
Cross lap or halved joint
Make 4.
Tapped for ¾" pipe

Of course the pipe must be threaded to fit the flange. To adjust the upper part of the pipe, insert in it, the whole length, a round wooden dowel rod, ⅝″ size, and cut off even with top of pipe. Exactly in its center set a round-headed screw, to extend ¼″ above the pipe. To fit this axis to the top, find the center of top (under side) and tack two small thicknesses of tin as a bearing. Over this center fasten a block of wood, of ¾″ stock, cut 3″ x 6″, with a hole bored through it a little larger than the end of the pipe. Make the finished top of the case a piece of wood of the handsomest grain you can find. It is to overhang the case all around. The screws for the work, except for the flange, are wire No. 8, 1¼″ round head, brass or blued. This bookcase will save many steps.

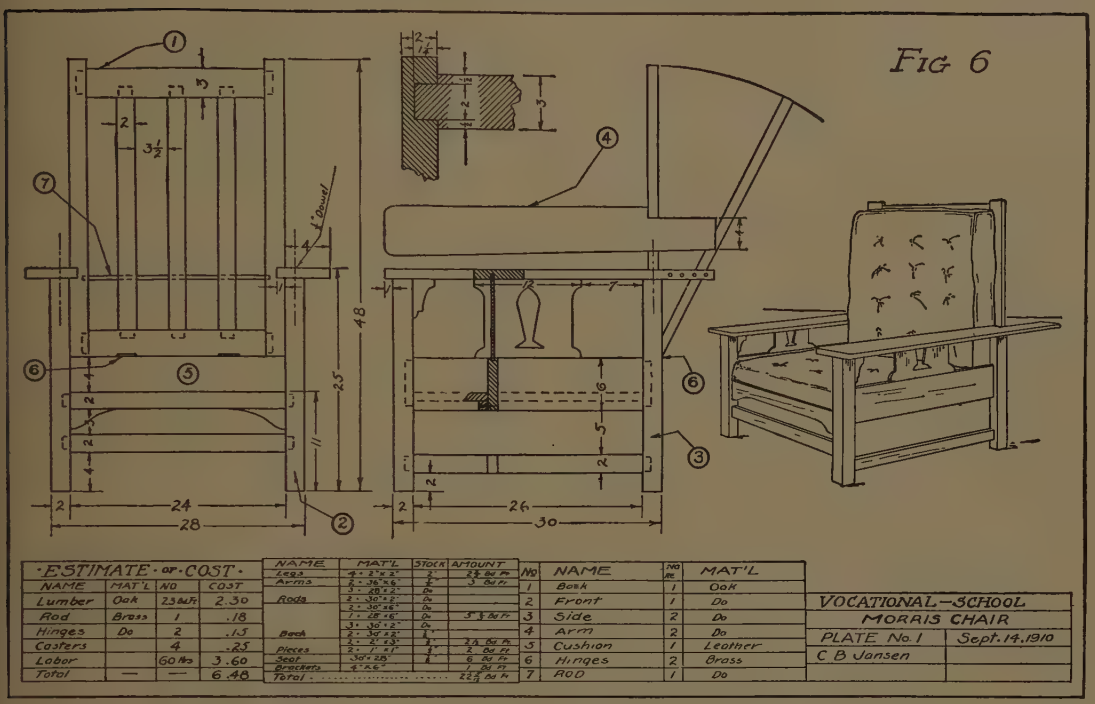


Furniture constructed of boards. Here is fun with an easy material to work. Such furniture when properly made wears well. Select small articles; build no frames nor add any paneling; never join at the extreme ends. To overcome shrinkage and swelling, fit the parts so that all grain will run continuously; then the boards will not crack. To prevent warping, join the parts so that they will hold one another flat. Three joints are adapted to this end: (1) the housed joint, Figs. 5, 6 and 7, using 7 for work that is to be kept in sight, and 5 or 6 for concealed work; (2) the dowel joint, Fig. 8; (3) through mortise joint, Fig. 9. This is a wide mortise, and a good joint, but is apt to weaken the stock. Fig. 10 is a haunched mortise, which is stronger, as it reduces the width of the continuous mortise. Fig. 11 shows a double mortise, and even this, on very wide boards, should be haunched. Again: all joints need stiffening. There are three good ways: (1) By blocking, as in Fig. 13 when not visible, or as in Figs. 14 and 15 when exposed to view. Blocks are either set with glue, or with screws or both. A square block is less liable to split than a triangular one, like 13, but it carries one-half waste wood. Visible blocks should be thoughtfully designed and well shaped, as they are a part of the decorative scheme. (2) By bracing, with strips of wood placed as in Figs. 16 to 18. The last number, 18, is a pinned-through mortise, the pin acting as a brace.

Brace C, at 16, is hidden, and therefore plain. Braces A and B are visible, and so must be attractively shaped. These two have chamfered edges. (3) The through mortise, as shown at 18. As a general rule, objects that are to stand and not hang should have a base wide enough to give a feeling of stability. The taller the object the wider the base should be. On the other hand, for objects that are to hang on the wall, excessive width should be avoided. For minor details, such as the spacing of shelves, the amount of overhang, and the size of braces, all your good judgment will be needed. No rules can be given. The outlines of this style must be changed to lessen its rigid look.



Building a taboret. This article has a fine flavor of the Far East. It is one of the easiest things to build. Two of the several types are here shown, Figs. 1 and 2. The top of one overhangs, of the other it does not. Either boards or joists are suitable for the legs. The height of the overhang type should not exceed one and one-half the width of its base. In the other style, as Figs. 2 and 14, it should not exceed twice the base width. The legs are generally braced at about one-third of their height up from the floor. The purpose of the braces is to tie the legs to offset the strain of usage. Stretchers made of strips of wood, halved together, may be employed. They may be placed either vertically or horizontally, as Figs. 3 and 4. Fig. 3 makes a stiffer brace than 4. A solid board may take the place of two stretchers as in Fig. 5. For a three-legged taboret, the stretcher should be built up of three pieces as shown in Fig. 11. This is done so that the grain of the wood will run along the three arms of the stretcher, giving the necessary strength to them. The three pieces should be joined at the center, as shown, by a slip-tongue joint. The grain of the tongue should run at right angles to its length to obtain the maximum strength. The stretchers may be joined to the legs as shown in Figs. 6, 7, 8 and 9, by housed, stub-mortise, or through-mortise joints. The bracing of the legs at the top may be done in one of four ways: (a) by mortising the legs directly into the top, as in Figs. 2 and 14; (b) in which a solid board is let into rabbets cut into the ends of the legs; the top is then screwed to this board (see Fig. 12). (c) Two strips halved together may be employed in a similar manner as shown in Fig. 10. (d) The most effective method of tying and bracing the legs at the top is shown in Fig. 13. Here two pieces halved together are joined into the top of the legs by means of a saddle joint. The last consideration in the construction of a taboret is the top. This is generally a single board, but it may be built up as in Fig. 10. This method lessens the tendency to warp, and has a more finished appearance than the plain top. The parts may be glued together and reinforced by a plain board or slip-tongued.



ESTIMATE OF COST			
NAME	MAT'L	NO	COST
Lumber	Oak	23 Bd Ft	2.30
Rod	Brass	1	.18
Hinges	Do	2	.13
Casters		4	.25
Labor		60 Hrs	3.60
Total	—	—	6.48

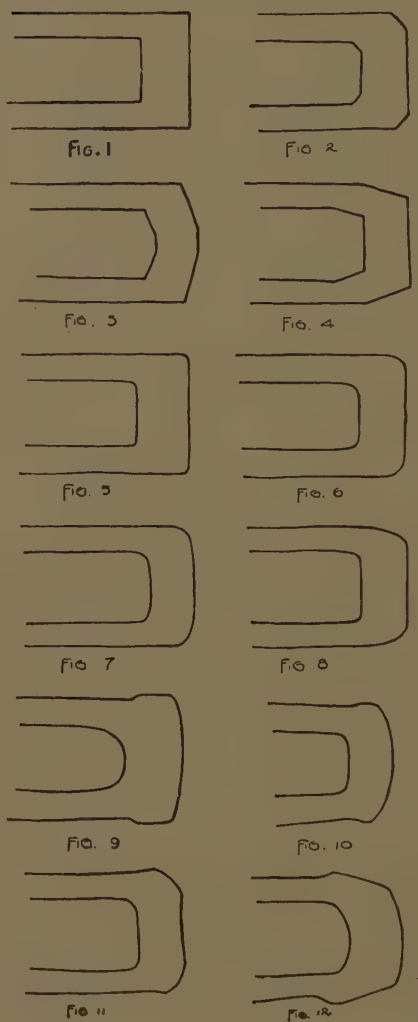
NAME	MAT'L	STOCK	AMOUNT
Legs			
Arms			
Rods			
Back			
Pieces			
Seat			
Brackets			
Total			

NO	NAME	NO PC	MAT'L
1	Back	1	Oak
2	Front	1	Do
3	Side	2	Do
4	Arm	2	Do
5	Cushion	1	Leather
6	Hinges	2	Brass
7	ROD	1	Do

VOCATIONAL—SCHOOL	
MORRIS CHAIR	
PLATE No. 1	Sept. 14. 1910
C. B Jansen	

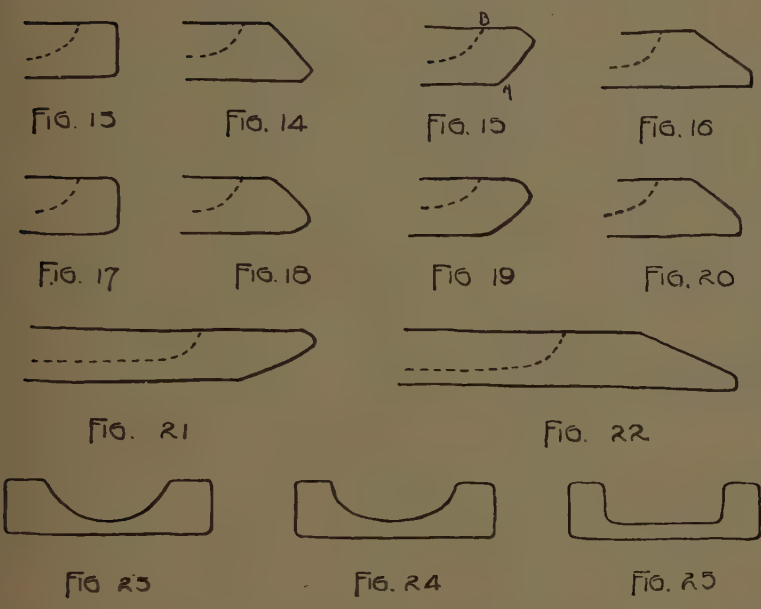
A MORRIS CHAIR. Yes, and of course too hard for ordinary boys and girls to make. What? But this one was made by a boy in a city school. The master of that school is not one who tells visitors that the students "never sell their work." No indeed; and when a lady saw a Morris chair and asked if she could have one made like it, he replied, "I think so: go and ask Charlie Jansen." Charles went right to work, and in the bill of estimate shown at the foot, you will see how he got at it. To be sure, when a few days later the principal asked him how he was getting along, he had to reply, for he was truthful, — "It 's going along, but I am losing money. There are more than sixty hours' work in it." But then, some day he will be a contractor, partly because he has learned, like the "burnt child who dreads the fire," to judge more accurately and to estimate more closely. The lady got her chair, and was well pleased with it. Now a Morris chair is not difficult to make. This is largely due to the fact that it was the thought of a great man, William Morris, a man with big, simple ideas. In designing his furniture he tried to make it all of such easy lines, strength of material, and good workmanship that it should serve well, and serve alike, the very rich or the very poor. Beyond this he disliked unnecessary padding, cushions, and the like. The estimate tables shown underneath the working drawings for the chair include not only the estimate of cost (at the left), but also a complete mill-bill, for the guidance of the builder when he buys his stock of the lumber man; and lastly, for the mill man who gets out the stock. You can always have your materials gotten out at a woodworking mill, down to the last stick, provided you wish to; but in so doing you miss the fine training of brain, eye and hand that you get in working it out yourself. The boy who made this particular chair had further arithmetic to do, as the numbered sections of the chair show. These are not for the purpose of describing the drawings, but as he took it, section by section, and on separate sheets, by means of his arithmetic and algebra, worked out each dimension and found what size to finish his stock to. At the right is a perspective sketch of the chair as finished; at the left is a front view, and between them a side view with a section of the material shown by tinted areas. This gives thicknesses not shown in the front.

A PEN TRAY. This involves Design in Woodworking. Let us fix the essentials; and first of these is size. A pencil is about eight inches long, and our tray should hold three or four. So thus are found the length and width that are to be, in this case, gouged out. Essential Number 2 is that it be smooth, so that we get no slivers beneath our finger-nails in using it. This fact helps us in finding the right kind of wood. It should be rather hard, of even texture, and, as the holder is rather a small object, and is to be carved, it should be not too pronounced in grain. Sweet Gum is an excellent wood for the purpose. Essential Number 3 is the outside dimensions. If the opening is $\frac{5}{8}''$ deep the total depth hardly needs to be more than $\frac{3}{4}''$; yet for good proportions, this may need to be slightly increased. The width and length depend largely on the general design; hence we are brought to the second step in our work, The Refinement of Proportions.



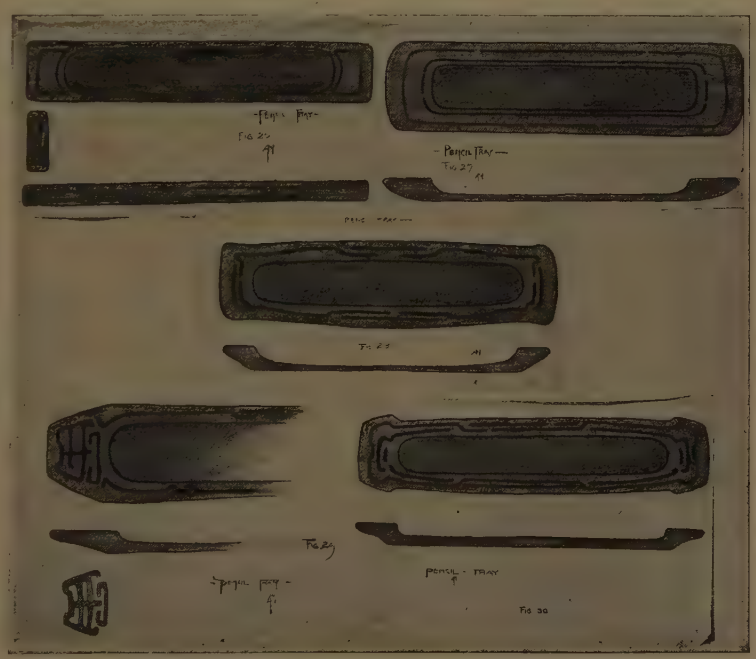
Both the nature of the wood and grace of form demand that the margin around the "trough" be greater at the ends than at the sides. So far as the strength of the wood goes, the sides may be very thin, but any attempt to cut down the end margins is apt to end in trouble; and the fact that the tray is long and narrow seems to demand artistic emphasis, which the thicker ends give to us.

Upon these proportions depends the beauty of the model. Exact multiples rarely give the variety that good proportion demands. Now as to general form: begin with straight lines, as in Fig. 1, the simplest possible shape. Within its limits it may be made very pleasing. But by introducing a line of change between sides and ends, we have a new element in our composition, as in Figs. 2, 3 and 4. You can make this more subtle and pleasing by using the curve, as: Fig. 1 passing into 5, 2 into 6, 3 into 7, and 4 into 8. Another legitimate element is the slight emphasis on the ends given by bending the side outlines in or out as in Figs. 9, 10, 11, or 12. So far we have considered the plan only. Let us think now of the side view or elevation. Starting again with straight lines and never forgetting good proportions, we may have, for instance, Figs. 13 to 16, page 249 (showing one-half of a cross section). Softening these into curves we have Figs. 17 to 20. But do not carry slanting under-cuts too far; else the tray may have too little base and be easily tipped over. In designing the side elevation do not forget that all must be kept harmonious. See Figs. 21 and 22, which are side elevations of ends 19 and 20. The form of the trough cannot be much varied, on account of its use, but Figs. 23, 24, and 25 offer some variety. Fig. 23 is an arc of a circle, 24 is part of an ellipse, and 25 is a straight bottom with rounded corners. Lastly, we have to consider the Decoration of our tray. In the model shown, what is suggested is simply line design cut with a veining tool. This may be applied, depending on the form of tray chosen, either on top or on the side, or even on both. The difficult part is to keep it simple. You will find, as we all do, beginners or experts, that you are inclined to carry it too far, to make



it too ornate. The illustrations from Figs. 26 to 30 suggest what you may be able to accomplish in this line, working for simplicity. As to the order of procedure in the actual making of the tray, the following is suggested: True up the piece of selected material to the required outside dimensions. Lay out the outline of the tray on the upper surface. Gouge out the trough or hollow which is to hold the pencils and pen-holders. Sandpaper the trough, being careful to preserve the edges. Cut out the outlines square with the face. Model the outline according to your final design, and sandpaper the outside. Lay out and carve the decoration. Finish with a coat of boiled linseed oil and set aside to dry. Shellac the whole when thoroughly dry, not before. Rub smooth with No. OO sandpaper, oiled. Shellac and rub down again with oiled sandpaper. Apply French polish as a superfinish if you choose. It dries quickly.

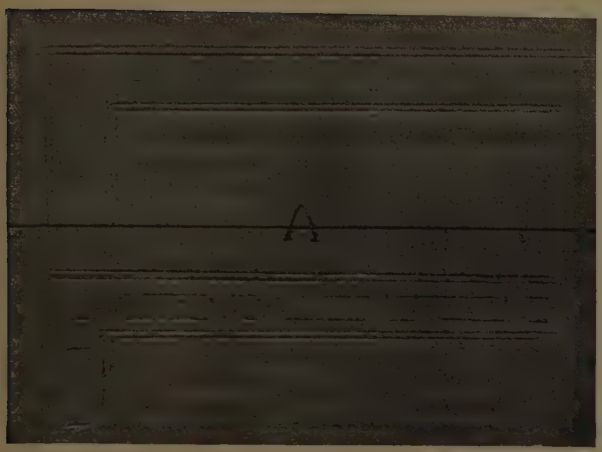
Did you ever think what a part the pencil plays in our life? A lump of charcoal, a stylus, a reed pen were the early tools of writing and drawing. Later on the quill took the place of the reed. The first lead pencils were so in fact, for the marking core was a strip of lead like that in lead pipes. Doubtless you have found out that such lead makes a plain and reliable mark. But it was not until someone discovered that the mineral called graphite would make a better and even more reliable mark that our lead pencil, as we still call it, came into use. But graphite is naturally gritty, brittle and crumbly, so it is mixed with other ingredients, and as clay is one of these, the more clay used the lighter gray is the mark. Thus are made the grades commonly used. The modern pencil is a masterpiece of design. Its receptacle should be.



again from beneath and out over B, securing the end; from over B to the top of C; from under C up in the corner over itself and D, and from under D to the top of E; from under E up over itself and F, and from under F to the top of G; from under G over itself and H, when it would go under H and over A again and up in the corner and out over B. A new rush or rushes may be added when leaving the under side of one round to go to the top of the opposite side, as D to E. First cut off the poorer of the old rushes short of E; insert the butt of the new rush between the rushes forming the strand and secure by twisting. The butt ends left down on the diagonal lines are cut off as shown at 4, which is the under view of a finished seat. A new rush may also be added as the strand rises in the corner as from under G to the top of H. Number 2 shows the strand carried round six times. In No. 3 the short sides have been filled and half the remaining space on the longer sides covered by carrying the strand from one side to the other, adding new rushes and crossing in the center like a figure 8. Number 4 at *x* shows how to fasten the end by carrying it beyond the center and twisting it once or twice around a strand. The resulting weave of this pattern is three thicknesses, and this is "stuffed" as shown at *y*, Number 4, by thrusting in rushes doubled over the end of a chisel-shaped stick.

The rushes are pushed between the lowest and middle layers. When done, the four triangles of the seat should be slightly highest at their centers. The front of a chair is usually wider than the back, requiring more strands to fill it. Numbers 5 and 6 show two methods of meeting this requirement.

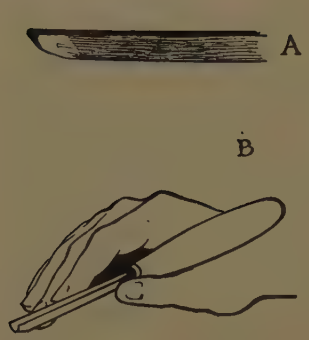
RUSH SEATING. Of course you wish to learn this old pioneer trade. The rushes are usually the common "cat-o'-nine-tails," but only those bunches without the "cats" should be used. Various other rushes are used for this purpose, including corn-husks. Gather cat-tails any time between July and September and dry them, preferably under cover. To use, prepare them by wetting and rolling in a wet cloth over night. Wring out the extra water before using, in a clothes wringer. A regular or square seat is composed of one long strand, made by adding new leaves at the corners as needed. The exposed parts are twisted as they are woven. Plate 1 shows one round of such a continuous strand. Two butt ends of two twisted strands are placed down in the corner at A, the strand is carried out over and around A, up in the corner



Wood carving. How beautiful is a well-carved piece of furniture, a stair-newel, or a section of wainscoting or paneled wall! There is something restful about it. But this is true only in so far as the carving is simple. While at times the master hand has broken the bounds of simplicity and its work has blossomed out into an elaborate chair-leg, medallion or canopy to some Gothic niche, yet the best carving always maintains a certain simplicity. This is very desirable in the beginner's work, for wood is tough and fibrous, even as marble is hard and brittle, and the tyro soon finds that he loses or spoils more than he makes beautiful. "Drawing in wood" might be given as a nickname for carving, thinks Mr. Frank A. Leavitt of Chicago, who is responsible for these illustrations. Like every other medium in which you aspire to work, you must consider the limitations of the material and tools. Designs have been known to be given which required so many tools and were so intricate that success was impossible. First, you must certainly have a working knowledge of drawing, for you will employ it all along. Carving is not to make things, but to beautify things already made. But accuracy in wood carving is, strange to say, not as essential as it is in drawing. It is not the most important factor in wood carving. In fact, the carving which is preserved in our museums to-day because of its fine artistic quality, would very often, in parts of it, fail to measure up to a close standard of accuracy in line, bisymmetry, etc. When you made your toys and other objects in wood you were directed to make them very true to pattern and exact in line; but when you come to ornamenting a model made with such care, it is not needful, nor is it to be desired, that each member, each leaf, or stem, or bud or fruit or animal's head or human face, be just like its fellows in shape, size or depth of cut; this might be true of the drawing out of the design you proposed to carve, but the first thing needful in any good work is that it be plain enough to be seen. And to make this possible in carving wood, the principal thing is to have the masses balance well, and the different parts brought out by their shadows. Mere accuracy of outline should

be avoided, even as nature never makes any two leaves precisely alike. Take time enough for your work; sharpen your tools, and have a care not to cut yourself. When you try to hurry through a piece of carving, you are almost certain to spoil it. Do not make just a couple more cuts before sharpening the tool, when it is rebelling just a little against the tough grain of the wood, or disaster is almost sure to meet you; a tool slips, the surface is torn, and the work is spoiled. It is hard to realize exactly what is meant by a really sharp tool. It should be at all times so sharp that it will easily cleave across the grain without hard urging, and thus tearing it.

And remember again, that, however carefully you hold the tool, if it slips, and your members are in front of it, a severed artery may result. Arkansas slip stones and a leather strap are essential for sharpening tools. Two tools will serve you to begin with: the veining tool, with a V-shaped end, and the gouge, which is circular. Fig. A was made with the veiner, B with the gouge.



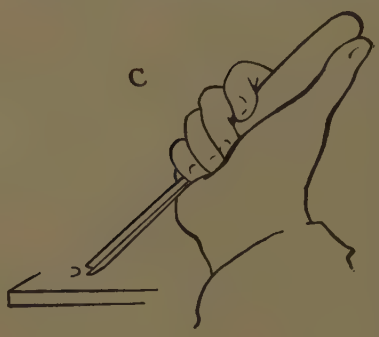
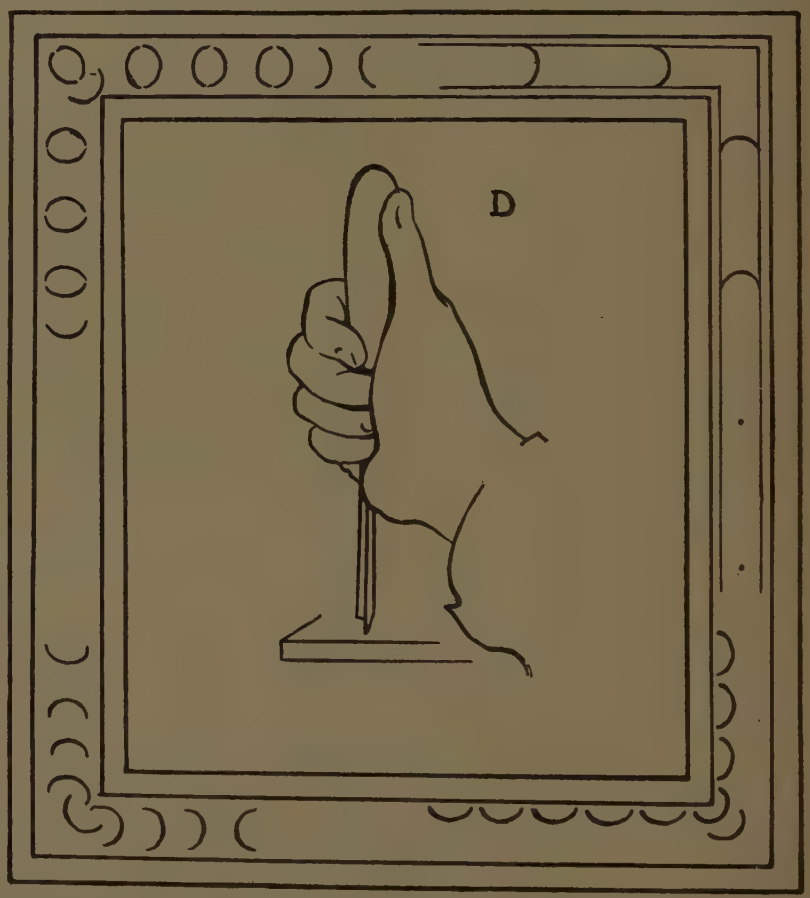
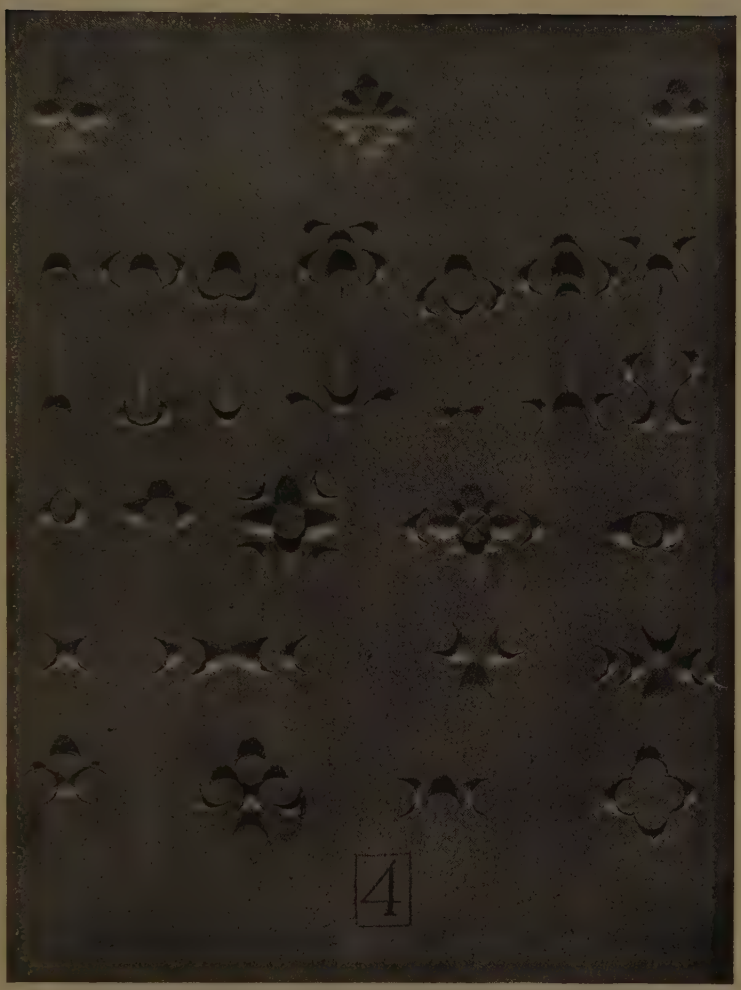


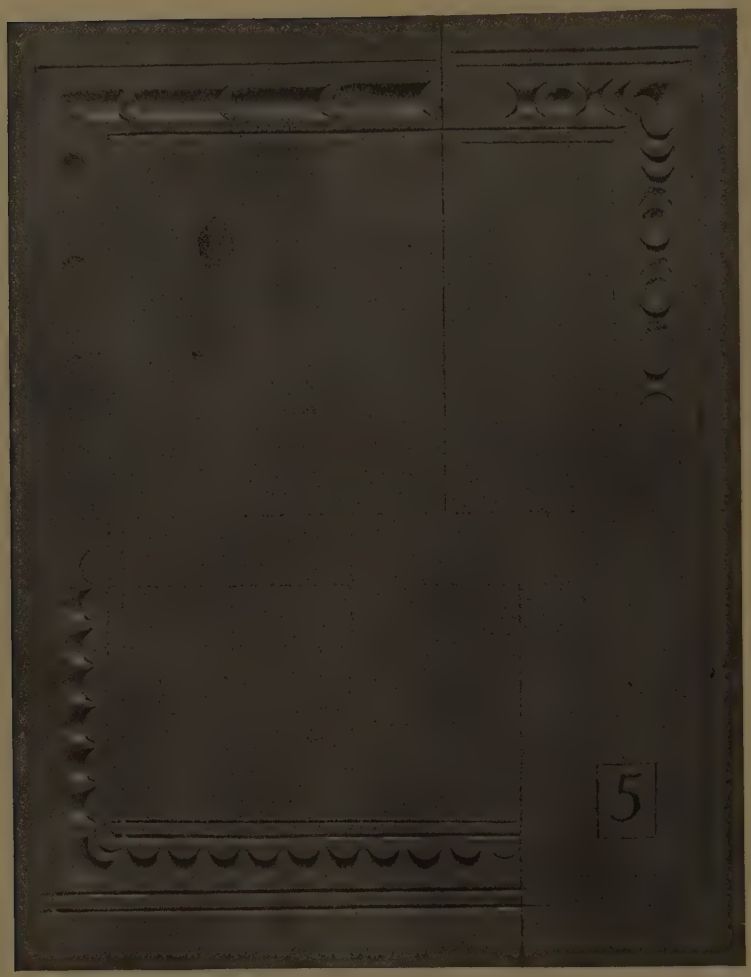
Fig. A shows simple borders only, and such were probably done by the first carvers with two slanting cuts of a single tool, knife or chisel. The veining tool is simply two such tools made into one. B shows where opposing cuts made with the gouge have resulted in values, obtained by the depth of the cut, which determines the amount of cast shadow. These and the following examples were done with a small veining tool and a gouge about ¼″ wide, a No. 21 sweep (Buck Bros. numbers). Now that you have been introduced to the tools, let us consider methods of working. While the carver usually clamps his work to the bench, and holds his tool with both hands, you may find it advisable to hold the tool, in much the same manner as a pen, but allowing the handle to drop into the hollow between the thumb and forefinger, as shown at B, on this page. Holding it thus, the third and fourth fingers act as "brakes" to prevent slipping, and the force used may be applied only by the thumb and first two fingers. Skilled carvers often employ this cut and beginners will certainly find it the safest. Gradually you will find, by starting in these cautious ways, that your whole arm will be brought into play. In making long, straight lines, a rule or other straight edge may be used as a guide. With a little practice this becomes as easy as drawing with a pencil. At D are shown various first cuts made within a simple border line, really the beginnings of patterns. The hand holding the tool shows the simplest vertical cut made with the gouge. This should be made by first pressing downward squarely into the wood, as at D, and then, as at C, inclining it slightly, removing a crescent-shaped chip. This cut can be varied by inclining it at greater and greater angles with the vertical as shown at B.





These cuts can be arranged in a great variety of ways and in combination with straight or even curved lines made with the veining tool. The illustration on this page gives examples of units which will develop naturally, as you will find, in your first practice with the tools. Something more may properly be said right here about the kind of wood to be used. This is very important, especially at the beginning of practice.

Among those suitable is poplar or whitewood if soft, clear and straight grained. You will find it excellent for your first work. It is light enough in color to show such drawing as is needed and to give the necessary contrast with the shadows produced by the cuts. It also cuts well across the grain and does not offer too much resistance to the young arm. You should try the effect of the tools on spare pieces of wood. Of course, if you are so fortunate as to have had a nice set of tools given you, it is not necessary that you lay them all aside save the veiner and gouge; but you will find, for actual work, that it is best to begin with these two only. To try the others, however, will certainly give you a knowledge of how they will act against the wood. As you begin to feel confidence in your hand and arm, you will find that the units will grow under your hand into attractive borders and designs. And if the soul of the artist is in you, as let us sincerely hope it is, your fancy will begin to take flights of its own. Consider for a moment this one sheet or panel of cuts; just as in a consideration of what the simple square is capable of, in another part of this book, so it will become apparent here that there are great possibilities in the arrangement of these simple units. It is often the case that a mark or cut, by itself, has no meaning, no attraction for the eye. But double it, or sometimes merely repeat it, and beauty at once springs up unbidden to gladden the senses. Note the two exquisite units in the third row up from the bottom; the third and fourth from the left. Think of what a combination they would make in simple alternation in evenly spaced lines upon a given area! In thinking about such work, one naturally turns back to the days of the Tudors in England, the work that is seen in the paneled interiors of many an ancient manor-house standing to-day; or to the golden ages of carving in all lands, like the period, could it be surely known, when the Norsemen made their massive benches.



make the natural, right-handed cut, study the middle illustration on page 259. This also shows a bench clamp at the right-hand end of the block of wood, which is being carved. In the lower illustration on this page is seen the position for the left-hand cut, and you will find that there is very little "right-handed" principle in carving. You will easily learn either way. The upper hand applies the power and the other guides the point and acts as a brake. The first cut should be as deep as you can make it with a single sweep of the gouge, being careful to keep both corners out of the wood. The cut may then be widened but not at first deepened, by cutting from either edge of this first cut, keeping both corners of the gouge still out, but keeping the inner corner nearly on a level with the bottom of the first cut. The outer corner will, of course, be well up in the air. This first cut should take your stroke one half the length of the cut. Meet it from the opposite end, and test the depth. Lay a small strip of wood across the tray, and drive a brad through it to the depth of the deepest part of the cut. Gauge the rest of the cut by means of this simple implement.

The larger illustration shows what can be accomplished by simply repeating a cut, forming a border by inclosing it between lines; but below is shown the carving of a pin tray. Draw the top view on the block, and either clamp or hold the piece to the bench. You can tack down blocks with brads to hold the carving block. To hollow out this tray we shall need at least two, and preferably three additional gouges, Nos. 4, 7/16″; 5, 3/8″; 7, 1/8″, Buck Bros. Begin with the "quickest" gouge, that is, the one that is curved the most. For the best way to hold the tool, to

WOOD CARVING IN RELIEF. You have learned something about starting right in Incised Carving; that is, where the figure is made apparent by lines entirely cut in, or lower than the finished surface. Relief carving is where the figure is left raised above the average surface or background. It may be either high or low relief, and both, in the hands of masters, have their recognized limits. Furthermore, the raised figure may be left flat or it may be shaped into a more or less naturalistic surface, when it is said to be "modeled." The five cuts on this and the following page illustrate the process. The narrow cut at the top of this page is a piece of masterly carving, from a German marriage chest or cabinet of the Fifteenth Century. It is in the Bavarian National Museum, Munich. Do not think that simple relief carving is necessarily easy. The right-hand illustration on this page shows some that is apparently simple, and it is in as low relief as could well be done and have the figures show. But from its very nature it requires the utmost accuracy of tooling. The drawing for part of it is shown at the lower left hand, and you will see that you cannot afford to let a tool slip even ever so little. Eight tools were used to produce this figure, and good judgment is required to select the right ones. At the bottom of page 256 is shown a fan-shaped design, the drawing for which is shown on this page at the lower right. Of these two, the left-hand drawing is much the harder to execute. You could carve this left-hand design much better by following the body of the scroll, and cutting that out, than by cutting out the background. In fact, by thus cutting the figure it becomes your background, as it leaves raised the space which is the natural background. To cut this you will need the two tools already described and a new one, a parting tool. It is a V-tool ¼" No. 41, Buck Bros. pattern. This is V-shaped, but with a "point" formed of a very short straight line having flat surfaces both on the inside and outside. This is the critical part of the tool, and a clean cut cannot be made unless it is kept keen of edge. Like the veiner, it must be sharpened at this point further back than the top of the tool. It should be able to cut clean across the grain. The characteristic processes of this tool are progressively shown in the larger of the illustrations on page 256. They show five steps, lettered from A to E inclusive.

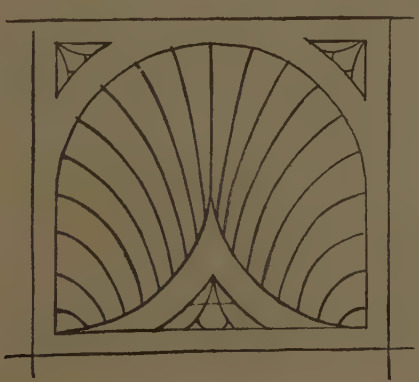


Fig. 3.

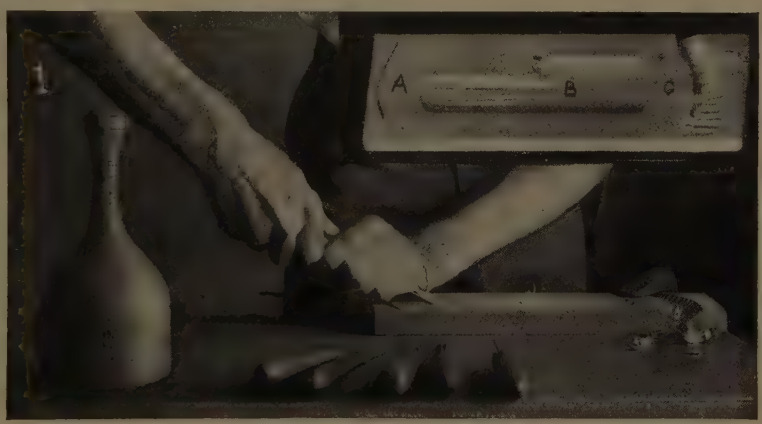
straight cut. In D, the "figure" is shown slightly modeled, the surface being broken up by a single cut of the gouge. In E, this is carried a step farther. As with incised work, some practice with the tools will be necessary. You should try and reach the result you aim at with the first cut of the parting tool, as it is much easier to guide the tool when it is cutting on both sides. After trying on waste wood you will gain confidence and be able to cut directly to the line. This saves time and looks better. While this form of carving is as applicable to borders and single units as the incised work, it is capable of being applied to much wider fields of endeavor. Panel effects may be produced on the tops or sides of simply constructed boxes. The design shown at the bottom of this page is adapted from an old English chest dated 1680. At the top of page 257, at the left, are shown four stages followed in carving this unit into a repeated design. The stages are: lower right, upper right, upper left and lower left. Let us abbreviate them, as we shall refer to them in detail, thus: L. R., U. R., U. L., L. L.

In A, the long lines are carved with the veining tool and the short cuts are made with a single stroke of the parting tool, the chip being removed by the upper corner of the same tool. Thus far it is both in effect and reality incised work. In B, the long lines are deepened with the parting tool and alternate short cuts are made in the opposite direction. While this is, in reality, incised work, it is in effect relief carving, since the zigzag figure becomes prominent. In C, this effect is still more pronounced where the curved cut with the parting tool is substituted for the

Now then, L. R. shows the design drawn upon the wood; U. R. shows the lines cut with the veiner and the parting tool, those made with the latter tool being light at the beginning of the cut and deeper at the end. Counting upward from the right over the crown of the design towards the left, the points from second to fifth show how the end of the line is left by the parting tool, and points 6 to 9 show how the end chip is removed by the upper part of this tool. In U. L. the first three points, counting leftward and downward, 10, 11 and 12, show the corners rounded by a vertical cut of the gouge, and remaining points in this quarter show the chips removed by the gouge. The background is now ready, and there remains only the modeling, which is illustrated in L. L. Here it will be seen how the modeling of each point was first begun with a single stroke of the gouge, and then the edges of the point (or shall we not now call it "leaf"?) were brought to a sharp edge by other cuts on each side of the first one, until the result stood out as well-modeled leaves or "members" of the design. These other cuts were made by the gouge meeting the original cut made by the parting tool when the leaves were first cut. On the sixth and seventh leaves, L. L., counting always downward, you will notice that the lower edges appear somewhat rough. This is because the first cut was of necessity made against the grain; the last three leaves show the lower side made smooth and also brought to a sharp edge by cutting with the gouge, in the opposite direction, that is, with the grain. This is explained at length because it illustrates one of the cardinal principles of wood carving; namely, that constant watchfulness must be given to the grain of the wood. In modeling, especially in high relief, a single curve may carry the tool with the grain at one point and against it at another; and clean cutting is only possible where great care is given to this matter. Numerous applications will be found for carving of this nature, a few of which are suggested in the outline forms of furniture shown on page 258. When you have mastered your tools, try designs.

APPLIED WOOD CARVING. Here we have the suggestions for applying the art, referred to on the previous page. Let us begin with the chair, as that is probably the article most used in our modern life. There is nothing that adds such a refined touch to furniture as a little carving applied at the proper part of the object. We never see a chair with a carved seat. The seats that are cut to fit the body are not carved, they are simply shaped. It would be as much out of place to carve the seat of a chair in an elaborate pattern as to mold a dinner dish with a relief pattern inside. The one would discourage good dish washing, and tend to fracture, the other would tire everyone who sat upon it. The chair legs and back both lend themselves to decoration, and there it should be applied. You will find a rich field of study in chairs alone, not to mention the other common furniture of a household. The great minds and master hands of their day have ever given much thought to the inventions for resting the tired body, and perhaps the great chairs of the Flemish and Spanish periods of art may be mentioned as good examples of the common things made beautiful. But probably no easier chairs were ever invented than those of the eighteenth century, particularly of the type that we have named after our early governors of the Massachusetts Bay Colony, such as the Brewster chair. Unfortunately the designers of styles like this one stopped practically at utility, without ornamentation. But even they shaped the seats and came as near to decorative carving as they dared in a sternly Puritanical age, at the point where the hands naturally grasp the ends of the chair arms; these they cunningly fluted to fit the fingers. How well chosen for decoration is the mid-panel of this chair back. Also the chest in the upper left-hand corner; how much easier to move upon "legs" than to be dragged on a flat bottom, scraping over the floors. And in each one you will notice that the inclosing form of the design is shaped to follow the general shape of the whole; an oblong vertical best fits the side of the bookcase or the chair panel.

More APPLIED WOOD CARVING. The upper left-hand illustration shows a design that you can copy without difficulty once you have mastered the tools. It is a simple combination of the flower-petal form with hearts, and a quarter-foil in the center. The two other plates carry us a little further on in thoughts about the methods of carving. The illustration numbered 1, which has been referred to before, shows the actual working out of the pin tray. At A–B is shown a top view of the work, in which is illustrated the cutting made with the gouge as described on page 254. The curved cut seen at the right-hand end of the block shows how the cuts are made for trimming around the ends. The outline is first marked out with the veining tool, cutting very accurately to the line. With the gouges which most nearly fit the outline cut vertically into the wood, using the mallet to do so. After making a vertical cut, meet it with an oblique cut as shown on page 254, number 3 illustration. Remove the chip at the same time, thus clearing the way for a deeper cut, and proceed in this way until the end is entirely cut off. Be careful of your bench while doing this; place under the tray a piece of waste wood, which will receive the tool-ends as they cut through the tray block. It is likely that the lower end of this cut will not be very smooth, but this can be remedied in the final shaping of the bottom of the tray. Remember always that the work is more to teach you good wood carving than to hold you to strict accuracy. The demand for that will soon enough show itself. To finish out the bottom, clamp the tray block on the bench upside down, and having previously drawn such lines as you need for general guidance, rough out with the quick gouge and mallet the beveling of the sides. Fig. 4 shows this part of the work in progress. Thus far, again remember that you are not to be too critical, for if you are, your disappointment at rough results will spoil all the fun. You can be inaccurate without being slovenly. The beauty of a well-carved, freely handled pin tray is like unto that of the trunk of a fine old apple tree. Would you like the tree trunk as well if it were perfectly round and absolutely straight? Not a bit of it. And if you are after accuracy, saw and plane out your tray, and bore the trough with bits, and be done with it.



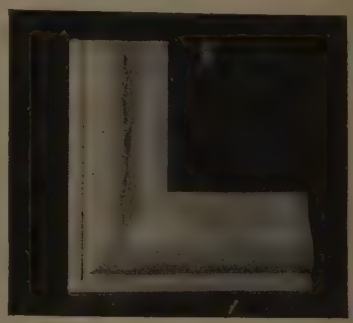
If you live near a city you ought to be able to buy a clock shape somewhat like this one. Set yourself then a problem to plan the contour and a simple decorative pattern to be left in relief by cutting away the background. It is desirable that the design be so planned as to provide long cuts rather than to break it up into small and "fussy" places. Corners may be modified, and even the whole line of any part. For instance, the sides now are vertical; why not so modify them that they slant inward as they ascend; taper, after the fashion of many things of ancient Egypt?

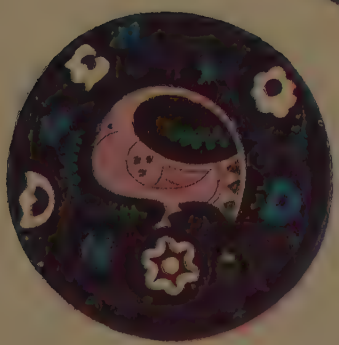
Another article of common use (or it should be) is the bookcase, or the table book rack. The ends lend themselves admirably to decoration in this form.

PICTURE FRAMES

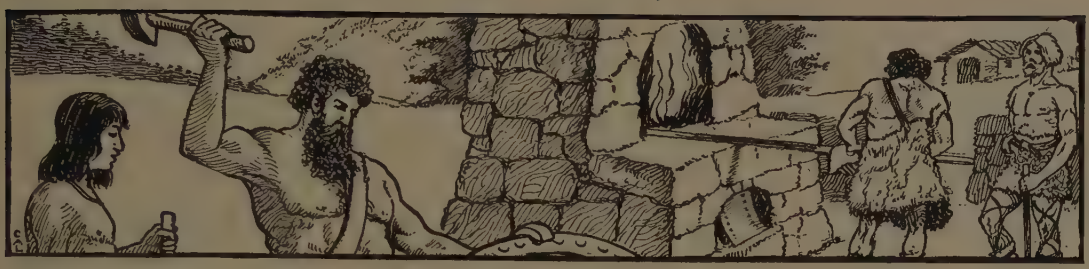
made with a half-lap of halved-together joint also offer a source of delight in this simple treatment. Instead of furnishing patterns, why not set for yourself a design something like this: Plan a picture frame for a given picture, dimensions to be stated, the strips to be $\frac{5}{8}''$ thick and from $1\frac{1}{8}''$ to $1\frac{3}{4}''$ wide, the corners which outline the joint to be treated as one unit, the spaces between to be carved in relief with simple patterns of slightly modified straps. A few suggestions for patterns of this type are given at the right of this page. Perhaps the hardest of all to accomplish with real artistic force and skill is the plainer frame shown below. But this will be found extremely helpful practice. It exercises you in the long cut and in modeling and furnishes a definite and somewhat measurable problem.

A picture frame made in this way will prove to be highly artistic if the work is not sandpapered but is left with the tool marks as shown in the illustration, and the wood finished only with oil or wax. By this is not meant to go out of one's way to leave the surface a mess of refined gashes, but to show a difference from smoothed machine work. And now that you have had a few helpful ideas given you, if the love of the beautiful is really a part of you, visit whenever you can and as often as you can the nearest piece of really good carving. Maybe someone of wealth and refinement, with devoted purpose, has caused to be built in your town a church in the Gothic style. If so, you will doubtless find within it some of the best modern wood carving obtainable. Better still, if your home is within a short rail journey of any of the great museums, visit it; of such are the Museum of Fine Arts, Boston, the Metropolitan Museum of New York, the Field Columbian Museum of Chicago, and the Pennsylvania Museum School of Industrial Art in Philadelphia.



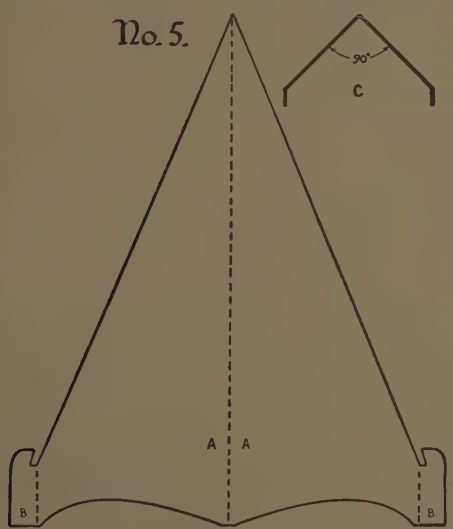


COLOR IN METALRY. WORK OF PUPILS UNDER DR. VYDRA, ROYAL HUNGARIAN SCHOOL OF ART, BUDAPEST



METALRY

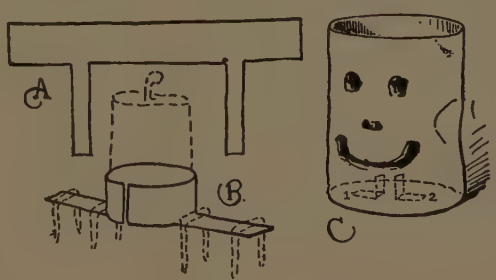
SINCE the days of Tubal-Cain men have loved to work in metal. There is a certain fascination about forcing an obdurate substance to do one's will. Wood splits, checks, and warps out of shape. Not so metal. Once gotten into shape it stays put. Metal working, in its elementary forms, has a fascination for strong boys too. Beginning with simple objects, such



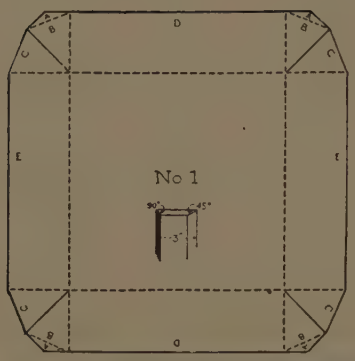
as those given first in this section, a handy boy will soon acquire sufficient skill to achieve things of no little beauty, things of permanent use in the home. The equipment for such work is not expensive. At first one needs only an old pair of shears, a file or two, a prick-punch, a cold chisel, and three kinds of pliers, — flat-nose, a round-nose, and cutting pliers. These, together with those already at hand, — a hammer, a bradawl, a nail set, — will be sufficient for making all the simpler objects here described. Later a coping saw and a soldering outfit become necessary, and a few other implements which are specified when required. The one easily besetting sin of the beginners in metal work is impatience. In metal working one cannot hurry. Metal itself will not hurry — except when in liquid form, and even then it is in no hurry to cool! In metal work the rule is "Slow and sure."

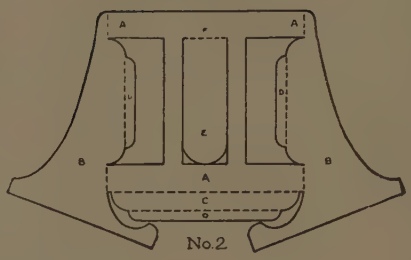
The PHOTOGRAPHIC EASEL, No. 5, is easily made; a sheet of 24-gauge brass, $5\frac{1}{2}'' \times 6\frac{1}{2}''$ in size, is needed. By "gauge" is meant the measured thickness of the metal. Transfer the pattern to the brass by drawing it on paper and cutting this out to trace around, with a medium soft pencil. Cut upon the full lines; bend upon the dotted lines as shown in plan at C.

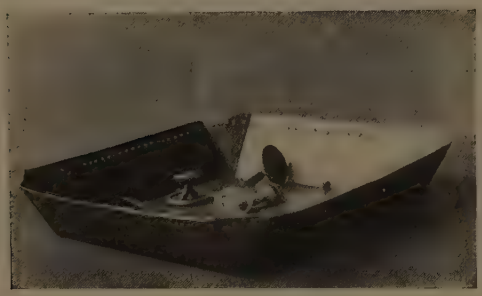
This TIN CAN JACK-O'-LANTERN offers practice in beginners' metal work, though made of



nothing but tin. The strip cut out with large size (old) shears is bent into shape B for holding the candle. Two carpet staples instead of the four shown will be enough to rivet it to the bottom of the can. Slip the can over the square end of a stick and punch the holes for the staples with a hammer and pointed wire nail. You can use a piece of wire instead of the staples if you choose. For the face, start the holes by punching and enlarge with a round file.

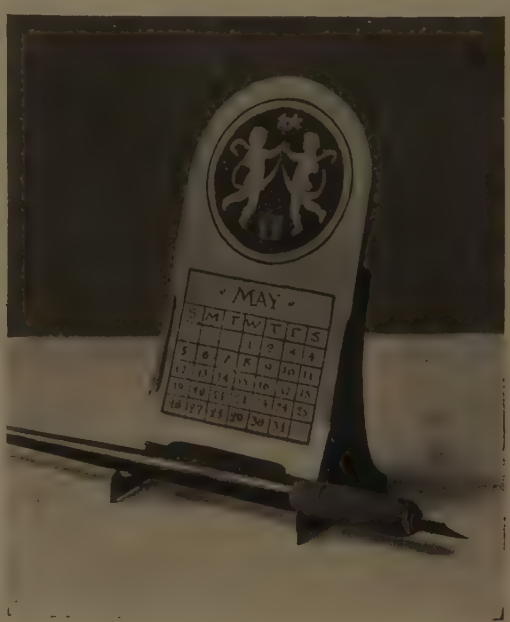


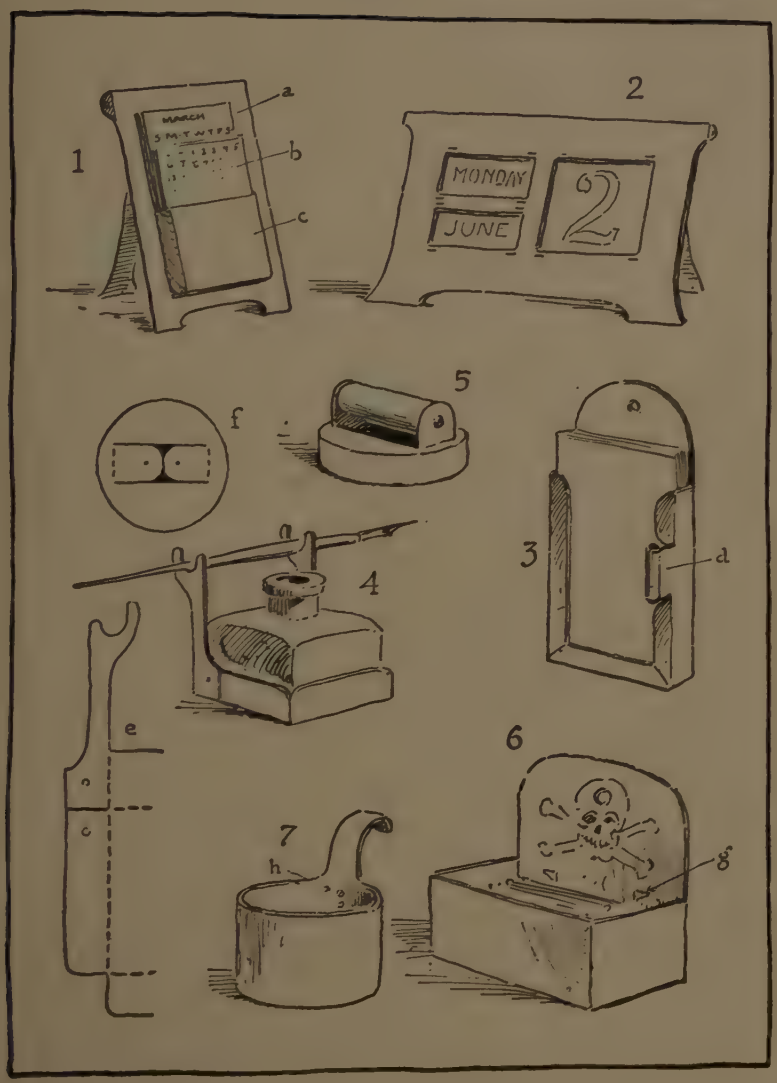




A PIN TRAY AND AN EASEL CALENDAR. These are of sheet brass or copper of a thickness from 18- to 23-gauge. The flat is shown at No. 1. In the center of the flat is a little sketch showing the form necessary for the wooden anvil on which the tray should be bent. (No. 2 diagram refers to the other problem.) Transfer the design to the metal by re-drawing it on the brass, by tracing it with impression paper, or by pasting the drawing, made on transparent tracing paper, directly upon the brass. Cut the shape on the heavy lines with tinsmith's scissors. The dotted lines are for bending. The wooden anvil is made from a $\frac{7}{8}''$ board, 3" wide, as shown in the sketch referred to above. This anvil must be held securely. First, bend down the small laps at the corners, A, on the dotted lines, until they are at right angles to B. Bend up the triangles B at about 45° to the sides D, by turning your tray bottom upward and hammering them into position on the wooden anvil. Next, bend up the triangles C at the same angle. Bend up the sides D at about 60° with the bottom. Bend up the sides E at the same angle or until the triangles C are covered by the triangles B. Bend down the laps A to clamp the triangles together.

AN EASEL CALENDAR. Transfer the flat to the metal the same as for the tray. Cut on the heavy lines. See diagram No. 2. This metal frame holds the paper or cardboard calendars as shown at the foot of the page. The strip E, shown in the middle of No. 2, is to be bent upward at the top to hold the calendar from lopping backwards. The cutting of outside lines is done with shears or tinsmith's scissors. The inside cuts are made with chisels of various-shaped edges. You can purchase a small metal-working kit of tools for about $2.75. After cutting, bend the laps D inward till at right angles with the sides B. Bend the lowest lap O upward until at right angles with the part C. Bend C upward until at right angles with A, over the end of a quarter-inch board. Bend the sides B backward on the dotted lines until at right angles to the back A. Bend E upward on the line F and hammer it down flat, continuing the plane of the back. Polish the whole with emery cloth. The cards, six in number, are each $2\frac{5}{8}'' \times 4\frac{1}{2}''$, with a calendar and its zodiacal sign on each side.





USEFUL COMMON THINGS IN METAL. Fig. 1 shows a CARD CALENDAR, easily made from sheet metal and ten cards. Six cards (a) are sufficient, utilizing both sides, to give the months and the abbreviations for the days of the week. Four cards (b) are sufficient, utilizing both sides, to give all possible combinations. The cards should be white, the division lines may be red, and the figures black. The little metallic pocket (c), with or without ornament, is made one piece and fastened in position by little points thrust through slits in the back and bent over. The T-shaped piece forming the support is furnished with little projections on the cross-arm of the T which fit into laps left at the upper corners and bent at right angles to the face. Fig. 2 is a BUSINESS CALENDAR with cards which slide into metallic pockets on the back. A card for each day of the week, six cards for the months and sixteen cards (of thinner material, both sides utilized), will make possible all necessary combinations. The pockets are held in place by little projections thrust through slits in the face of the plate, and "upset." At Fig. 3 we have a KITCHEN MEMORANDUM CASE made of one piece of sheet metal to hold memorandum cards. It has an end rolled up to form a socket for a lead pencil.

A PEN RACK, shown at Fig. 4, may be made to accompany a square ink bottle. It is made in one piece. Two rivets are sufficient to hold it in shape. The general construction is shown at (e). A BISCUIT OR COOKIE CUTTER is shown at Fig. 5. It is made from the cover of an old tin can. The top should be cut as at (f). The MATCH BOX, 6, was made from a tin cracker box, part of the bottom being bent up for the back, and the sides, cut at an acute angle, bent around and folded against the back, the points tucked through slits as at (g) and bent secure. Any device may be pricked with a hammer and sharpened wire nail. The CAMP DIPPER, 7, can be cut from a tin can, the handle being a strip left intact and doubled back upon itself. The rivets hold the end in place and give it added strength.

Fig. 1

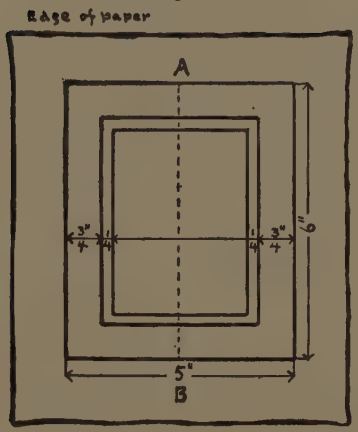


Fig. 2.

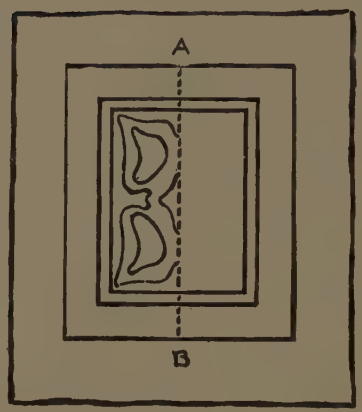


Fig. 3.

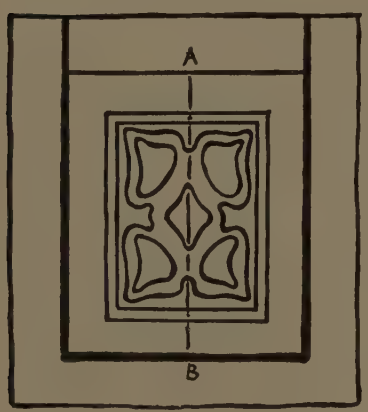
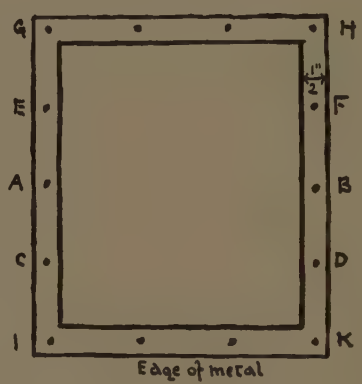


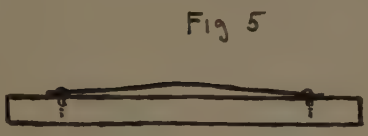
Fig. 4.

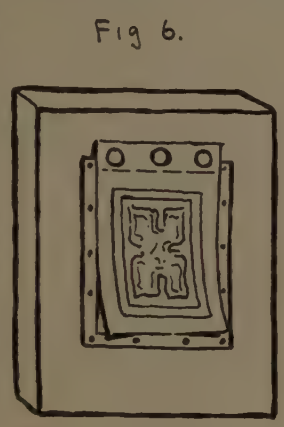


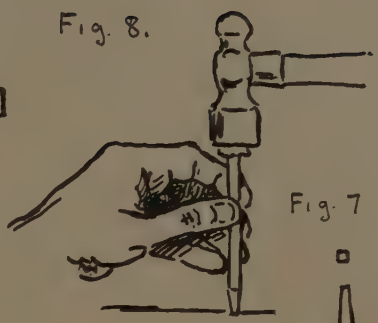
HAMMERED METAL. These pages, 264–265 inclusive, illustrated by over a dozen successive diagrams, give directions for the making of our old friend the small tray, out of a practically new material. For selected sheet brass or copper is somewhat different in its nature from tin. Tin can be cut and bent and that is about all. We are now coming to consider metals which demand the skill of the educated craftsman; we must know something of the metals, and in working them we depend no longer merely upon cutting, bending and clamping down corners, but mainly upon skillful use of hammer and anvil. You will need a vise, and a bench if you can arrange one; a block of hard wood, 12″ × 3″ × 3″; a small block of steel or iron for riveting, having one smooth face and one right angle and not over ¾″ thick; a block of soft wood, pine or cypress free from knots, 9″ × 12″ × 2″; a pair of trimmer's shears No. 6 (cost 30 cents); a small brad-set, used as a rivet punch (10 cents); a half-round file, medium (15 cents); a hard-wood mallet (25 cents); a ball peen hammer (40 cents); a pair of flat pliers (20 cents); a pair of round-nose pliers (20 cents), and a small screw-driver (15 cents). One end of the mallet must be ground to a hemisphere. You can add, if you are going into it seriously, a pair of metal shears, large (at a cost of 50 cents); a rat-tail file (10 cents); a wood rasp, medium (15 cents); some ¾″ round-head steel screws; wire brads of grades 20-, 10-, and 6-penny; a few sheets fine emery paper; a rivet set (at 20 cents); some scraps of soft wood; a roll of soft sheet brass, gauge 23, 12 inches wide (costing at wholesale 18 to 20 cents a pound), or some sheets of soft copper, gauge 23 (at 20 to 25 cents a pound). Let us take the tray in hand and proceed. Cut the stock 6″ × 7″. Now lay it aside for a while, and make your drawing for the design, using a mechanical drawing kit-board, T-square, and 45-degree triangle to insure accuracy. The lay-out must be right. Draw out the pattern of the piece on a center line A–B. Be accurate! On one side of the center line, within the smaller rectangle, draw any simple conventional or floral design, avoiding small spaces, as shown in Fig. 2. Now try it repeated, to be certain that it will appear well in that form. When you are satisfied with it, fold on the line, and transfer it to the opposite half by rubbing the paper with some hard surface, when you will find it complete as in Fig. 3. Trim the paper, leaving a flap, as at A, at the top. It is now ready to transfer to the metal. Upon your sheet of brass, which should measure just 6″ × 7″, draw

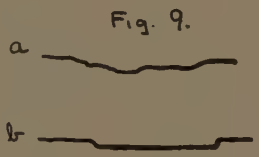
a diagram, as shown in Fig. 4, page 264. With a nail-set punch holes as indicated, large enough to take the small screws. Do this punching upon one side of the hard-wood block. These 14 holes are necessary to hold the metal; do not punch more; have them in the middle of the ½″ margin. You are now ready to screw the brass down upon the soft wood. Professional engravers and chasers use a bed of soft warm pitch, but soft wood will do for us. Locate the metal in the center of the block, and mark around it with the pencil. Start holes with the punch at points A and B, Fig. 4, and set in the screws way to the head, being sure that the metal lies flat between. Then put in the other screws, working from the center towards both ends as CD, EF, Fig. 4, pressing the metal perfectly flat as you go. Should you put in screws G, H, I, K first, the metal might buckle up in the middle as in Fig. 5, making a surface that would vibrate under the tool. Now fasten the top of the paper pattern as in Fig. 6, by three thumb tacks at the top, slip some carbon impression paper between, and trace the design. Remove the paper and draw the pattern permanently with a scratch-awl made by filing down a long wire brad with the flat side of the half-round file. When you do this, be sure to hold it in the vise between two pieces of soft wood, and so protect your wooden vise-jaws. Now take a tenpenny brad and file it as shown in Fig. 7, making a small square stamp on the end. Hold this upright in the left hand as shown in Fig. 8, and tap it with the hammer held in the right hand. Practice this first on the outer margin between the screws, being careful not to run over on to the design. Do not try to set the metal in deeply or the tool may go through. Avoid uneven depths like Fig. 9 *a*. A depth like 9 *b* is desirable. When you have gotten acquainted with this movement, begin on the pattern. As a rule, it is better to stamp down the background rather than the design. Deep stamping and high relief are not desirable, and are liable to puncture the metal. As the stamping progresses, the pattern rounds up in a pleasantly embossed design, showing a contrast of roughened background and smooth relief. On a small piece of work it is better if the stamp be rather small.

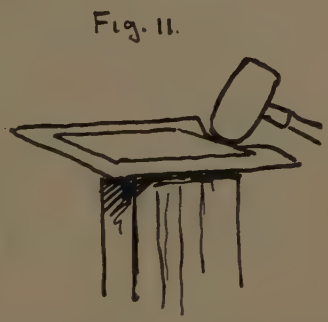
Keep the stamping clean and sharp to the line. Next you must give attention to refining the line of the design wherever it needs it. File a 20-penny wire brad to a screw-driver edge as in Fig. 10, and polish it with emery paper.

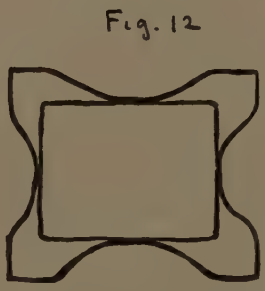


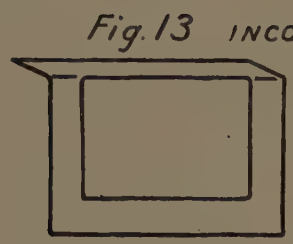


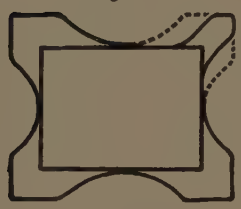


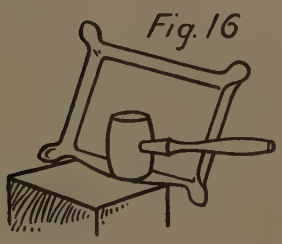












Be careful not to get it so sharp that it will cut the metal. Call this your chasing tool. Now remove the screws and with the shears trim off the outer edge of the metal which contains the screw holes. In shearing, cut always next the joint of the shears and not next the points, thus accomplishing the most work with the least energy. Upon the back of the metal draw the border all around just $\frac{3}{4}''$ from the edge. This may be left as a pencil line. Set the hard-wood block in the vise, end up, and placing the metal, raised surface downward, beat the middle of each side over the square edge of the end of the block, using the round end of the mallet as shown at Fig. 11. Bend down only the middle of each side (Fig. 12), for if one side is beaten way to the corners as in Fig. 13, it will be impossible to get a nicely finished corner. After the four sides are beaten as in Fig. 12, page 265, begin to work the corners up smaller from two sides, as shown in Fig. 14, working up carefully first from one side, then from the other. A very little practice with the mallet will enable you to do this quite easily if it is held properly. Never grasp any hammer or mallet rigidly, or force it down with the whole weight of your arm. Hold it in the hand loosely, allowing the weight of the head to do the work.

The tray should now look somewhat like Fig. 15. The corners are sharp and should be trimmed off carefully with the shears. If the edges are rough, smooth them with the half-round or rat-tail file and finish with emery paper. To relieve the straightness of the sides and make the tray more ornamental, set it on the end of the hard-wood block and with the mallet beat out the sides to an even curve as shown in Fig. 16. The tray may now be polished bright or colored by heating it slowly over a gas jet or over flame. Very beautiful color tones may be gotten on copper in this way, but the metal should first be made perfectly clean by the use of whiting, or salt and vinegar. This sort of metal work is of the "Worth While" type. Doubtless, you have heard of the Venetian or bent-iron work. It has been much in vogue, in fact, too much, and the true craftsman is conservative in its use. This is not because it is not good art when properly handled, for great masters have made it famous. But so have great masters made famous the arts of painting and sculpture; and because oil pigments and clay are easy to handle, many budding artists "rush in where angels fear to tread." So has it been with the Venetian work; it is so very easily done that it becomes too often a toy craft, and one for which the earnest student loses the respect a craftsman should feel for his craft. But in hammered metal the creative faculties are early engaged, and the thought must precede the stroke of hand, however skillful that may be. It is harder to "unhammer" sheet metal than to unbend strips of it.

Fig 17.

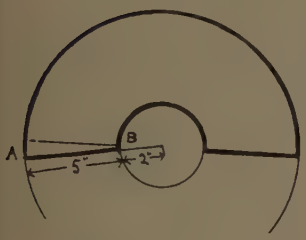
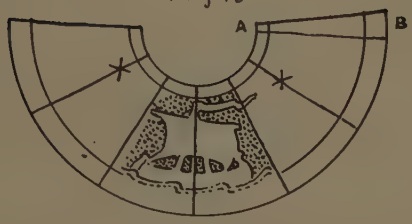


Fig. 18

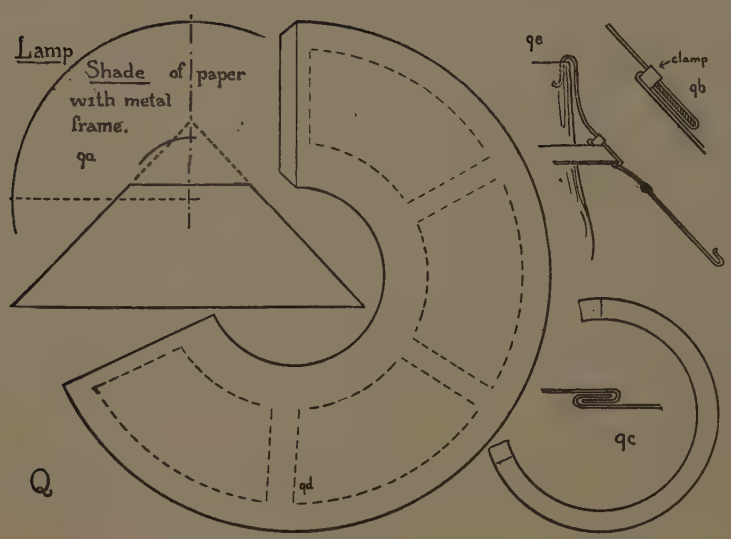


A PERFORATED LAMP SHADE OF BRASS. On a sheet of tough wrapping paper describe a circle with a radius of 7″, from the same center one of 2″, and draw one diameter. Measure ½″ from one outer end of the diameter on the larger circle, and from there draw a radius line to the center. Cut out the form as shown in Fig. 17. This may do for your lamp. If not, make a full-sized sketch of your lamp, side view; draw the shade in place as you wish it to appear, and from your sketch secure the right dimensions for your radii, A and B, the slant heights of the complete cone of the shade. See Q on page 268. Make a trial shade of manila paper. For the design we have chosen a Viking ship to be repeated three times. Fold under the flap A–B, Fig. 18, then crease the paper into thirds. Double again, leaving 5 creases and 6 divisions. Draw border lines in good proportion at top and bottom. On every other crease draw the unit. The tulip flower and leaf make another good motif, as shown at Fig. 19. For making a perforated shade you will need thin brass of gauge 28 or 30. 14″ wide is about right. When your pattern suits you, select the metal, and glue the paper upon it. Now for the perforation; file a small wire brad to a conical point. Placing the metal upon the hard-wood block, perforate the background in a series of small holes, fairly close together, and set irregularly. The paper will come off by soaking in water, but before you remove it, mark carefully around the pattern so as to know just where to trim with the shears. Punch five holes on the lap as at 20, bend the shade, and fitting carefully, mark through the middle hole on to the under thickness. Punch the holes, rimming them a little larger than your rivets with the brad. For rivets buy brass escutcheon pins, and cut off the points. Set them and hammer down as from *a* to *c*, Fig. 21, with the round end of the hammer. Fig. 22 is the wrong way. Fig. 24 shows a less secure way of lapping, by the "clinch" joint.

Fig. 19.

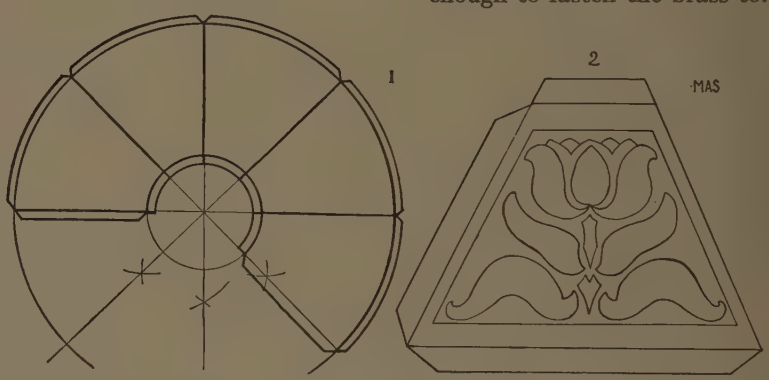
Fig. 20.

Fig. 21.



A METAL FRAME FOR A PAPER LAMP SHADE. The shape of any lamp shade of this sort is what is called a "frustrum" of a pyramid or cone. That is, one with the top cut off. At *qa* is suggested the cone. If a pyramid is the basis, of course the shade is cornered at each division. It may be anything from a square pyramid (four-sided) to an octagonal (eight-sided). This one is planned as a conical shade. A cone is steeper or flatter sided according as you use more or less of its outer circle in cutting it out. Try different proportions to become familiar with the principle; then you will see that a little more than a semicircle gives the best results for a shade. The frame for this shade includes the circular piece or hoop shown at *qc*, where also is shown how to clinch or clasp its two ends to fasten them together, and four uprights or ribs, one of which is shown at *qe*. At *qb* is shown the way the rib strip is clamped over the circular piece *qc*. This circular piece is shown in cross section between the folds of the rib. The paper part of the shade, which also might be made of stiff silk, is held in place by turning up the lower ends of the ribs. The circular band at *qc* will be found to be also a section of a cone when its ends are joined. The ribs may be ¼" wide, and the circular piece a little wider. The dotted-line areas are reserved for the decoration. Of course you could make the shade proper of metal if you chose.

A BRASS CANDLE SHADE OF SOFT METAL. This can be bent into shape mostly with your fingers. The No. 34 soft brass is sold for about 40 cents a yard. A quarter of a yard will cut two small shades. You need only an awl, good and sharp, and a board large enough to fasten the brass to.



Design your pattern with care, making it as simple and beautiful as you can. Thumb tacks of a good size (with round pins) will go through this soft metal, and the brass should be fastened to the board and the paper pattern to the brass, with these. Do not use for this work the cheap tacks where the pin is made by wedging a sharp piece out of the head. With the awl carefully pierce around the design forms, and finally pierce the background. Some little practice will be necessary in order to get the holes all alike in size. It is well at first to guide the point with the left hand, while holding the handle in the right. If you wish to save the pattern, remove it after outlining the figures. In this case, mark carefully around the outside before removing it. Trim the pattern carefully

to form with ordinary scissors, and proceed to bend the edges over the corner of your board. The edges are beveled at the corners to make room for the incline of the sections. You can fasten the parts with double-pronged paper fasteners, the heads of which are round and unobtrusive. The shades look much nicer if a fringe is added at the bottom. If it is added, it may be fastened in the same way. Lacquering the brass will keep it from tarnishing. Lacquer can be bought at the paint stores.

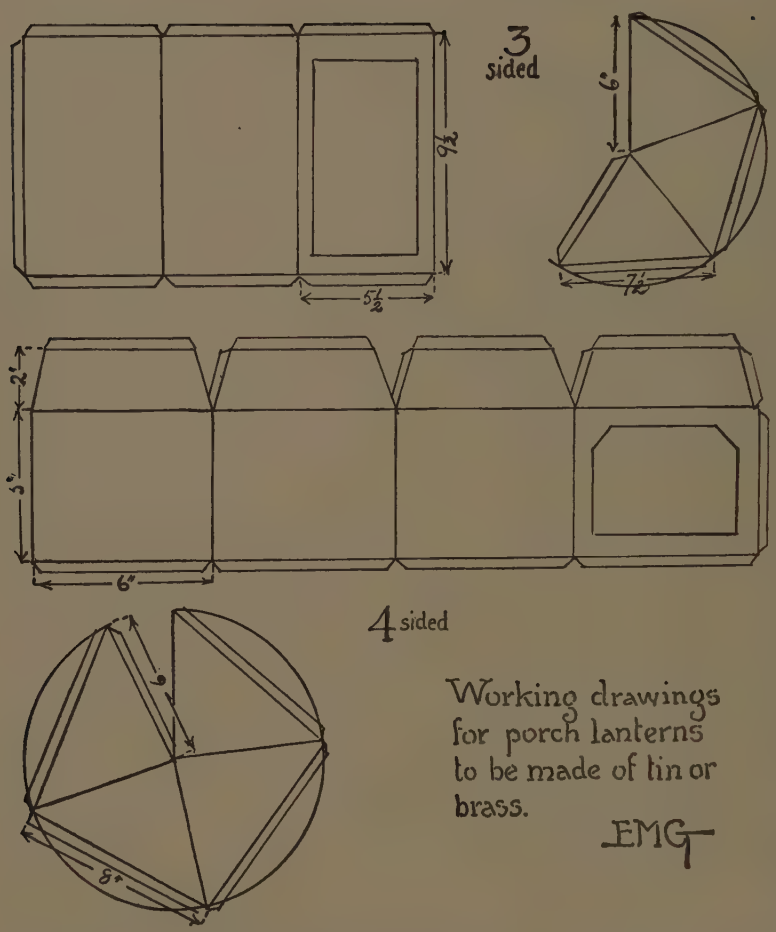
Above is our brass candle shade completed, with the fringe added as suggested. Note the solid and convenient pattern of the candlestick, all in good harmony, especially the enlarged part where the hand naturally seeks to grasp it. The details of the turning are all simple yet thoughtfully designed, with fine curves, and you would not wish one of them to be omitted.

The base, too, is heavy enough to prevent any ordinary push from upsetting it. You will find candle or lamp bases that have a sort of pedestal of marble, to make them even more stable. The designing of candlesticks for brass and silver was one of the fine arts of an earlier day. The famous brasses of the eighteenth century can hardly be said to have been equaled at any period since. Some of our best-known manufacturers of jewelry are still kept busy supplying the demand for good candlesticks. Beside this candlestick is shown a brass letter rack, in harmony with the shade.

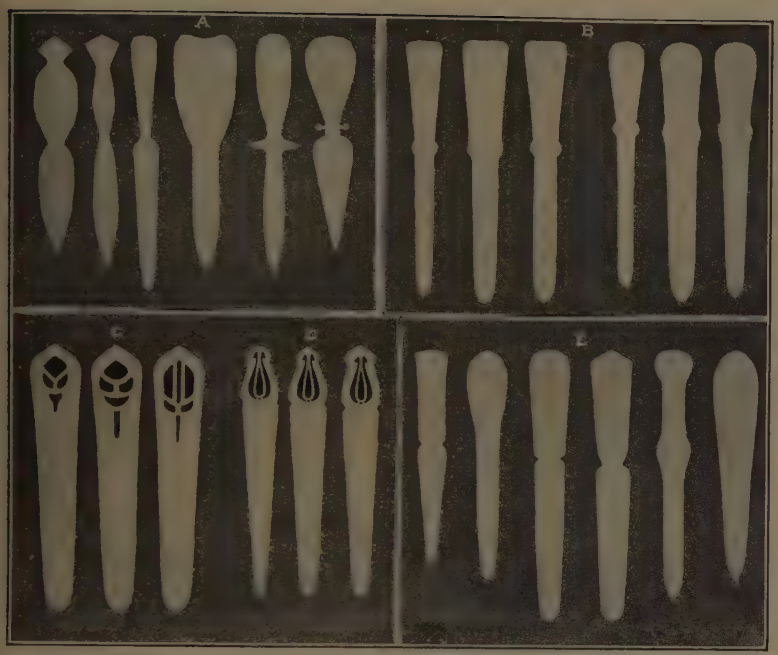
The dejected CREATURE at the foot of the page was suggested by an article for holding collar buttons, etc., offered for sale in a Swiss town. The original was of metal throughout, but a good tray can be turned from wood, and the bird carved; or a tin can cover can be utilized for the tray, the bird cut from a board, rudely carved with the knife, and the legs cut from sheet metal and riveted into position.

Brass has ever been a material that appealed to the lover of the beautiful. It is a mixture or "alloy" of copper and zinc, sometimes with a little tin added. In Genesis IV we read that Tubal-Cain was an instructor of every artificer in iron and brass. In Matthew X the Master instructed his first missionaries to provide neither gold nor silver nor brass in their purses. Kellogg, in his matchless "Spartacus to the Gladiators," says, "The strength of brass is in your toughened sinews." In our day of many good things, an imitation brass should be beneath your notice.

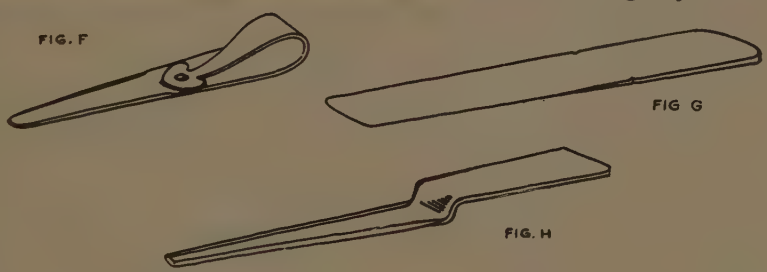
A Tray for the Dressing Table.



The brass for this PORCH LANTERN should be of gauge 27, which costs about 30 cents a pound. Perhaps no better example can be found of how a well-designed article finds favor with the general public than that of the "grandfather" lantern, as applied to our modern porch lamps. We do not try and adapt the glass lantern, with its screen of wire bars, and no one would think of making in fine metal a copy of the common wagon lantern. But because we all recognize the beauty of shape and design of the candle lantern our fathers made of tin pierced with holes, we perpetuate it in the modern electrical and gas lamps with which we light our doorways. You can indeed use tin for this lantern; but you will find brass easier to handle, less liable to cut your fingers, and far more beautiful. First make working drawings to determine your general proportions. The lantern body ought to be at least 9 or 10 inches high, not including the roof. The top view should be drawn first, and from it the side views projected. The roof should be laid out upon a circle, but never including the whole circle, as then it would be quite flat. Space off even distances of the number of sections required, three for a triangle, six for hexagon, etc.; cut out the waste section, slightly score the corners with a knife, and when folded and brought together the result will be a pyramidal roof. The less of the circumferences of the circle you employ, the steeper will be the pitch of the roof. You should provide for an overhang at the "eaves" to obtain the best effect. Be sure and leave laps wherever soldering, riveting or clinching will be needed for joints. The lantern will afford you practical problems to solve in determining its size in relation to electric bulbs, spaces for ventilation, and open areas, to emit light. If you mean to burn candles in your lantern, it must have a bottom and a socket for the candle, which may be made as shown on page 261, but made if possible so that it can be taken out and cleaned of the drippings. This type must also have a door. On page 130 such a lantern is shown with the door open, and directions for making the hinge are given. The design is sawed out while the metal is still in the flat. The carrying ring should be hung on a loose rivet. In this work you have both constructive and decorative design. The decoration of the dragon-fly shown on page 130 was backed by ground glass, giving to the wings a somewhat naturalistic effect. This design can be made by the simple punching of holes, as in the lamp shade, page 267. In punching designs, vary the round point with the chisel.

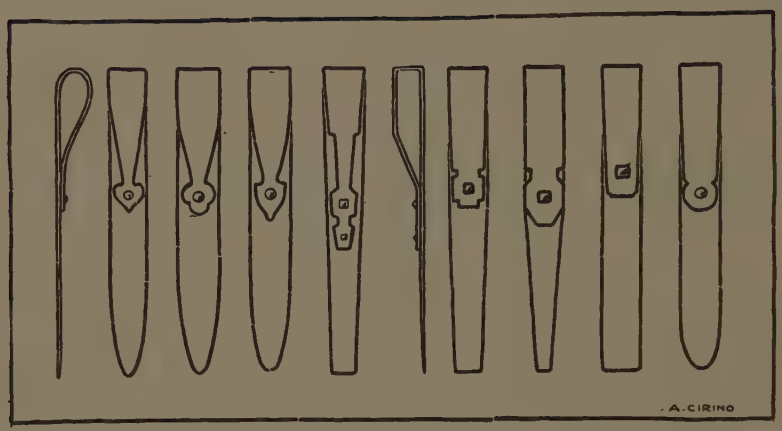


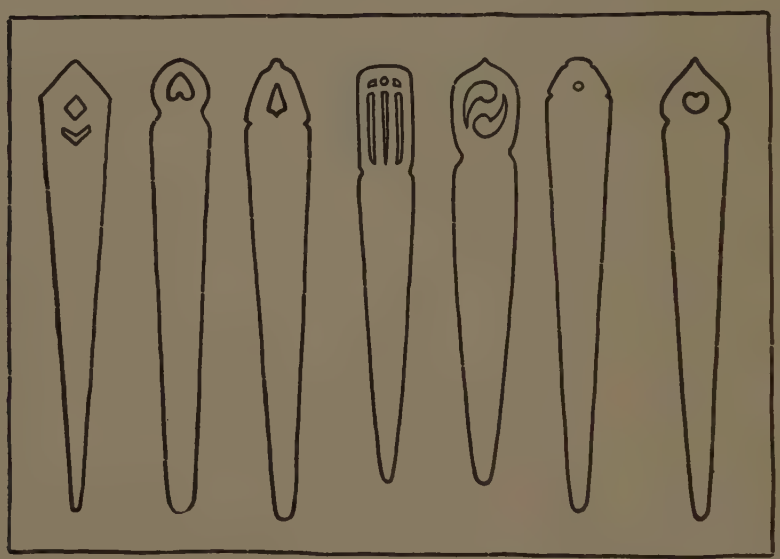
be described here; namely, piercing and enameling. Whatever kind of decoration is to be used, it should be thought out together with the outline of the handle, so that some relation will be felt between the two, having the decorative unit echo the outline of the handle of the knife. The design need not be symmetrical. When you are fully ready, take a piece of paper, a pencil and a pair of scissors. Fold on a center line, so as to have a center or balancing point for the right and left of your design. It may be well to make your first practice sheet of design symmet-



PAPER KNIVES AND LETTER OPENERS. Books and magazines often come from the press with the leaves uncut; to the first reader of these a paper knife is most useful. To one who wishes to open a letter in good form a letter opener is a necessity. The making of such an object is an interesting problem in copper work. The design is the first thing to be considered. As the knife is to be used to cut folded paper, it must have a blade with a fairly sharp edge, and as the shape of the blade is limited to a very few consistent outlines, the handle is the part to receive whatever character or interest we choose to give it. The handle should be so shaped that it will be comfortable to the hand when grasped. Sharp edges and irregularities in outline should be avoided and it should be proportioned in such a way that it will "hang" right in the hand. There are several ways in which the decoration of the handle may be executed, so that the kind to be employed must first be decided upon. It may be pierced, enameled, embossed, etched, inlaid, or carved. Only two of these methods will

rical — alike on either side of the center line; a straight blade, — not a curved one. Sketch on one side of the line the outline of the knife, and while the paper is folded, cut out both sides at once. When opened, this gives the pattern for the entire knife. Several of your first trials will be like those shown at section A, but by trying to improve and refine the design each time, you will finally have a good one. Section B shows a series of second trials that are much improved in shape. Section E shows a variety of good forms. Section C shows three knives of the same outline, but having the decorative units varied. Section D, the outlines modified and the unit the same. After you have worked out a fairly good design in this way, one method is to cut a strip of metal about one-third longer than the completed

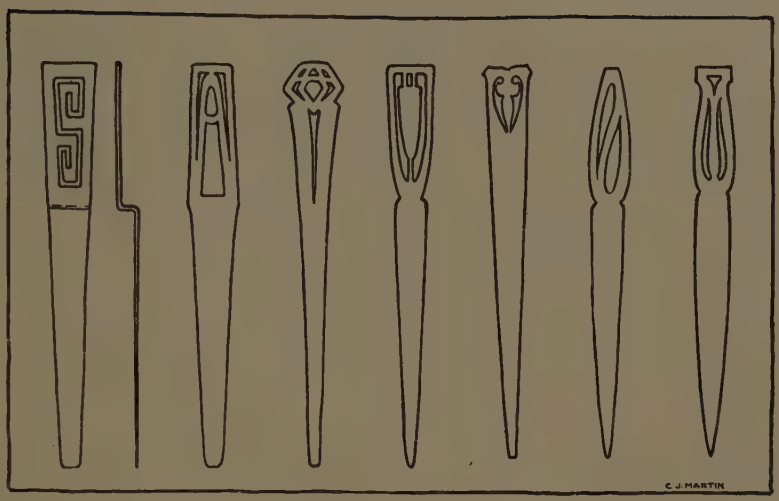


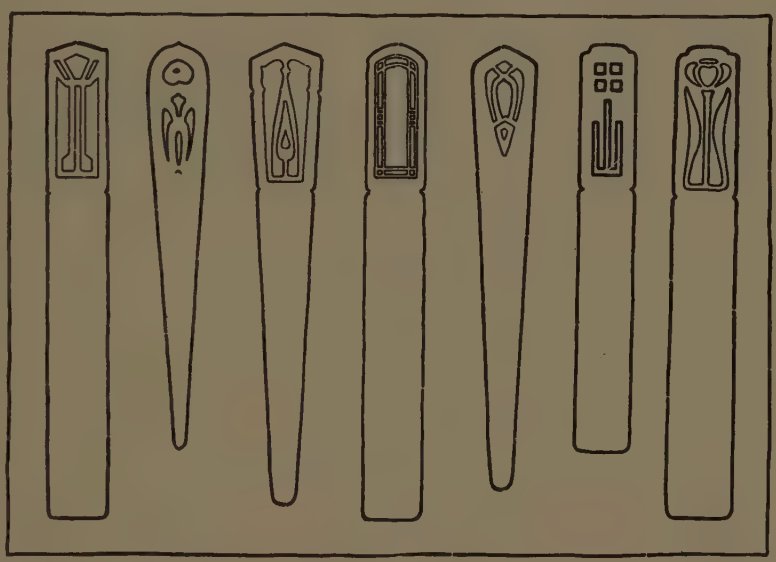


design requires, and bend over the additional length to form a handle, after you have cut the shape of the blade correctly. Also, file the edge before you bend the handle. Suppose you select copper as your metal, and 18-gauge is a good thickness for this form. A rivet, shaped in keeping with the rest of the design, is used to fasten down and hold the handle in place. Or a thicker metal can be selected and the knife cut or sawed perfectly flat, handle and all. If you object that this is not an easy shape to pick up readily, bend the handle portion into an offset as shown in the first illustration, page 273. This type should be of about fourteen-gauge metal. After choosing the thickness of metal suitable for the knife, decide on the kind of a surface you wish the metal to have. It comes from the rolling mill with a perfectly smooth, monotonous face. Interest may be added to this by going over it with a smooth domed hammer, gently striking it, and thus covering the surface with little shallow dents or facets. These marks may be varied according to the size of the peen of the hammer used. After this process the design is transferred by laying upon the metal a pattern that has already been made, and drawing around it with a pencil or scratch-awl. If a pattern has not been made, it may be transferred from the drawing direct to the metal by means of impression paper. When the knife has been cut in the blank from the metal, the cutting edges may be filed either from the upper side entirely, allowing the lower side to lie flat, or the filing may be done from both sides.

The pierced decoration is done with the drill and saw.

The file is used to finish all untrue edges. If the handle is to be enameled, a satisfactory way of applying it is to cut away the design or decorative unit with the engraving tool, making channels about 1/32 of an inch deep in which to place the enamel. The common engraving tools, known also as gravers and burins, can be bought at any well-stocked hardware store, or at least at the city stores. They are little chisel-like tools about four to five inches long, usually with one side of the handle flattened.





For convenience in working upon the knife, it is laid upon a bed of warm pitch spread upon a piece of wood. Let the knife gently bed itself into the pitch while this is yet somewhat soft, and as soon as it hardens you have a perfect vise for this purpose, which will never scratch your work. Or, you can tack it about securely with thin blocks of wood, bradded down upon a board. The handle of the engraving tool is held in the palm of the right hand, and the thumb, placed within an inch of the point, serves to guide the tool while cutting. By wriggling the tool a little from side to side, greater progress is made possible. After the design has been cut to a uniform depth and all edges kept smooth, the knife is taken from the pitch bed by warming it a little. After lifting it from the block a little kerosene on a cloth will remove any pitch that may have adhered to it. After this has been done it is next dipped in a nitric acid solution to thoroughly clean all parts that are to receive the enamel. For working in this beautiful craft, one of the fine arts in their broadest sense, you will need a simple outfit, consisting of a wedgewood mortar and pestle, a smaller agate mortar and pestle, a bottle of enamel, a point for applying the enamel, a saucer, a palette knife, and a piece of blotting paper. Enamel is seldom used in large quantities. It can be bought for about 35 cents an ounce. It comes in broken lumps, and these must be ground down about as fine as fine sand in the larger mortar. For very small work, grind it finer in the agate mortar. The point is a piece of large wire, ground to a point at one end, and somewhat flatter at the other, to enable one to reach into the smallest spaces. In preparing the enamel, it should be broken up while wrapped in strong paper, then placed in the mortar with enough water to cover it, when the grinding may be done. Pour off the water and rinse several times till all the milky substance is gone. Remove to a saucer with the palette knife. While still wet, apply with the point to the design, and allow it to remain in a warm place until the moisture has evaporated. If copper is the metal selected, it must first be cleaned by dipping in a weak

solution of nitric acid. Be careful not to inhale the fumes, as they are poisonous. Dip it quickly and rinse it in water, as the acid will eat away the metal if allowed to remain on it.

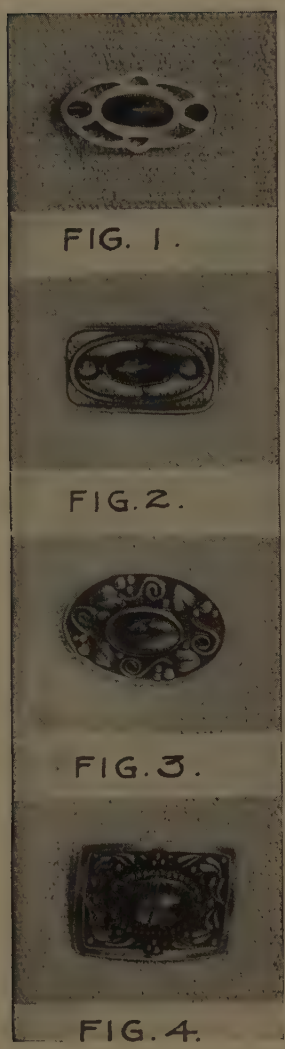
(If soldering has been done on any work to be enameled, paste a thick clay of yellow ocher and water about the joints and dry these at the same time with the enamel.)

The work is now ready to be fired, and the simplest way is to use the blowpipe. The work should be placed on wire netting with the lamp beneath, so that the flame may be blown from below. Be careful and not jar out the dry enamel. When the enamel settles or glazes and looks like a liquid, withdraw the heat and allow it to dry very slowly.

Any place you have missed may be filled over again. The enamel may be left as it fires, or it may be polished down with a rough emery file, a finer one, and lastly a Scotch stone, using water with each. Then, if the enamel is transparent, a final firing will be necessary; with opaque enamel it is not. Enamel while firing turns dark before it melts. Some prefer the duller surface of the enamel as the firing leaves it. In this case the last firing will not be necessary. After it comes from the fire it is covered with black flakes of copper oxide, which must be removed. To do this it is boiled in a solution of sulphuric acid and water. It is then washed in clean water and dried. As the firing process leaves the knife very soft, it must be hardened again, and this is done by going over the surface of the blade very lightly with a flat-faced hammer. If instead of allowing the copper to darken naturally, it is desired to darken it, dipping it in a solution of liver of sulphur will give this result. Rubbing it a little with dry powdered pumice, allowing the color of the copper to appear only here and there, will add to the attractiveness of it.

Over a dozen illustrations of finished paper knives are shown above and on page 275, in some with the bent-over handles, others with the offset handles, shown in the fourth and fifth on page 275, the pierced style, shown in the first, second, third and fourth, and the last four, which are enameled.

The paper knife as we know it is of modern origin. Forty years ago, or about the year 1875, every well-regulated business office had a "paper folder" hanging by its principal desk. It was uniformly of tin, sometimes japanned, sometimes beautifully painted a green, red, or brown, and varnished. Before varnishing, the imprint of some commercial house was attractively lettered upon it in gilt. The whole thing was well calculated to attract the eye of the imaginative boy, at a time when he had no art-craft work in his school course. That was almost all that was known as a paper cutter. It was used principally to fold legal blanks to their proper width for filing. Now and then some thoughtful individual had whittled out a paper cutter of smaller size, more like those shown in this description. Occasionally someone who had traveled brought home an interesting dagger, stiletto or dirk, which was kept on the library table and used as a paper knife. But the children were warned not to touch it. The art of the armorer which has furnished us so many suggestive models for paper knives was a high one, as practiced in those ages that we call "dark," when all the arts were made subservient to the trade of war. Some of the daggers, called by whatever name, stiletto, poniard (or poignard), short-arm, the skean-dhu of the Scottish Highlander, or what not, that were made during these centuries are often marvels of workmanship, exquisitely shaped and delicately wrought with filigree work and jewels. Now that their dreadful first purpose is a dead issue, long buried in the moldy past, they are beautiful as works of art. They were fashioned by men whose whole souls were put into the task and who had plenty of time for the work. If we go to the Orient, whence come some of the models on which the smaller paper knives are patterned, we shall find most fascinating examples of jewelry and inlay, where the blade of the knife, often of wonderful cutting quality, has been inlaid with gold and silver. A mail opener may be a scimiter or creese in miniature.



BROOCHES OR BREAST PINS. In all ages it has been the custom to adorn the person with ornaments of one kind or another and the present age is certainly no exception; for there is to-day a great and increasing demand for jewelry, perhaps more than ever before. Like all the arts, jewelry is much abused and there are countless pieces of poor jewelry in the world, jewelry poorly conceived and badly wrought. Yet it is pleasant to note that even in the cheaper sort, such as comes in the ten-cent prize package, now and again there appears good design, even though it may be applied to the brass-washed tin by means of a die or stamp. Jewelry demands much greater care than any other form of metal work; you must take the very simplest design forms to begin with, and you will find it rather difficult at that.

Jewelry must bear the closest inspection, and the utmost precision is required if you wish your work to pass muster. Begin with the more regular forms, such as the oblong, lozenge-shape, square or circle. The design may be done in piercing, building-up, carved, repoussé, enameled or set in gems or semi-precious stones. But of whatever kind, let it be simple.

FIG. 7

FIG 6.

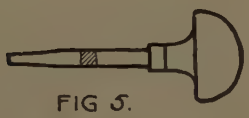
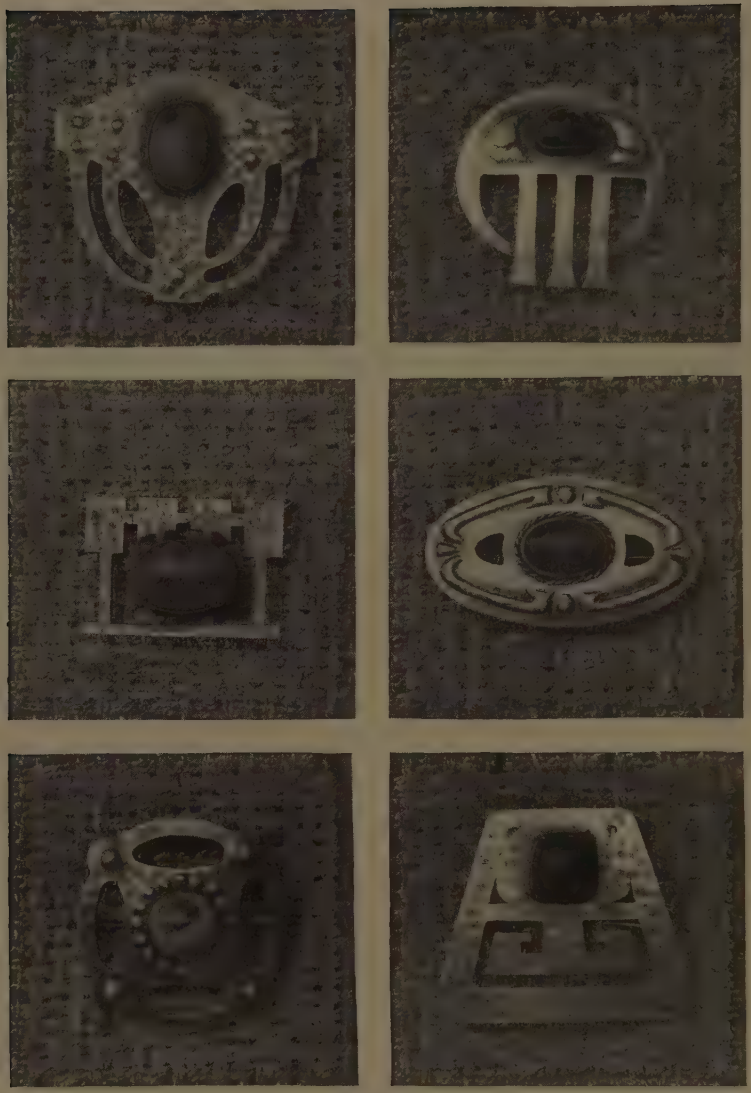


FIG 5.

but let us treat it as if for silver. We will select the right-hand brooch on this page (of the series of four), which is a long ellipse form with a very simple pierced pattern, its central part elaborated in the contrasting form of a square, which forms

By the term "set," is meant where the stone is made the center of interest. Such forms are shown on pages 276 and 278. They are in the style sometimes called the new art (*l'art nouveau*), and yet the lowest left-hand specimen shown on page 278 might have been taken from some old Saxon burial place or the hull of a burial boat of the Norsemen. In fact, there is nothing new under the sun, save in the newest variety of it. You will do well to confine your first efforts to piercing, until you have mastered the handling of the saw and file. A good design may be ruined if poorly executed. On the other hand a poor design is never redeemed by the best of workmanship; it only makes you pity the designer all the more. Make several studies for your pierced design, and when you are well pleased with the design transfer it carefully to the metal and drill holes in the places best adapted for starting the saw cuts. If a stone is to be used, and let us suppose that it is, the size and shape of the stone determines the size and shape of the brooch, so it is necessary from the beginning to have the stone and build the design around it. Here again we have an opportunity for good constructive design. Everything must be made subordinate to the central feature.

Semi-precious stones can now be bought at reasonable prices, from 25 cents upward, and when set in simple designs they make very attractive pieces of jewelry. Such stones as malachite, azurite, turquoise matrix, opal matrix, labradorite, amazonite, and others, work in very well with copper and silver. In the problem we shall consider, either metal might be used, the base for the setting of the stone. After bringing the design to a shape which pleases you, glue the paper pattern to the metal, and allowing it to dry, drill the small openings through which your saw will be inserted. Saw as close to the line as possible, but be very careful not to saw into it. After sawing out all of the openings the outlines are filed smooth and true. Needle files are used for this part of the work; they may be had in sets of assorted shapes, making it possible to file very small piercings. In setting, or securing the stone to the pin, the simplest method will be best. Cut a strip of 26- or 28-gauge silver about one-eighth of an inch wide and long enough to go around the stone; file the ends square and bind it around the stone securely with iron binding wire, such as jewelers use, and solder the joint. This must be done with the blowpipe and a tiny bit of the small wire solder. Care must be taken to have the setting fit the stone closely. It is better to have it a little small than too large. If too large it will be necessary to cut out a piece and re-solder, while if too small it can be placed over an arbor and stretched by hammering gently. When the band or setting has been fitted to the stone and the joint filed up, it is next put in place and bound to the body of the pin with some more of the fine iron binding wire, and soldered. In soldering, prepared borax is rubbed on a slate or rough earthenware saucer with water, and a little of this is dipped with a brush upon the parts to be soldered. The heat of the flame produced by the blowpipe will leave a borax stain on the silver, and this must be

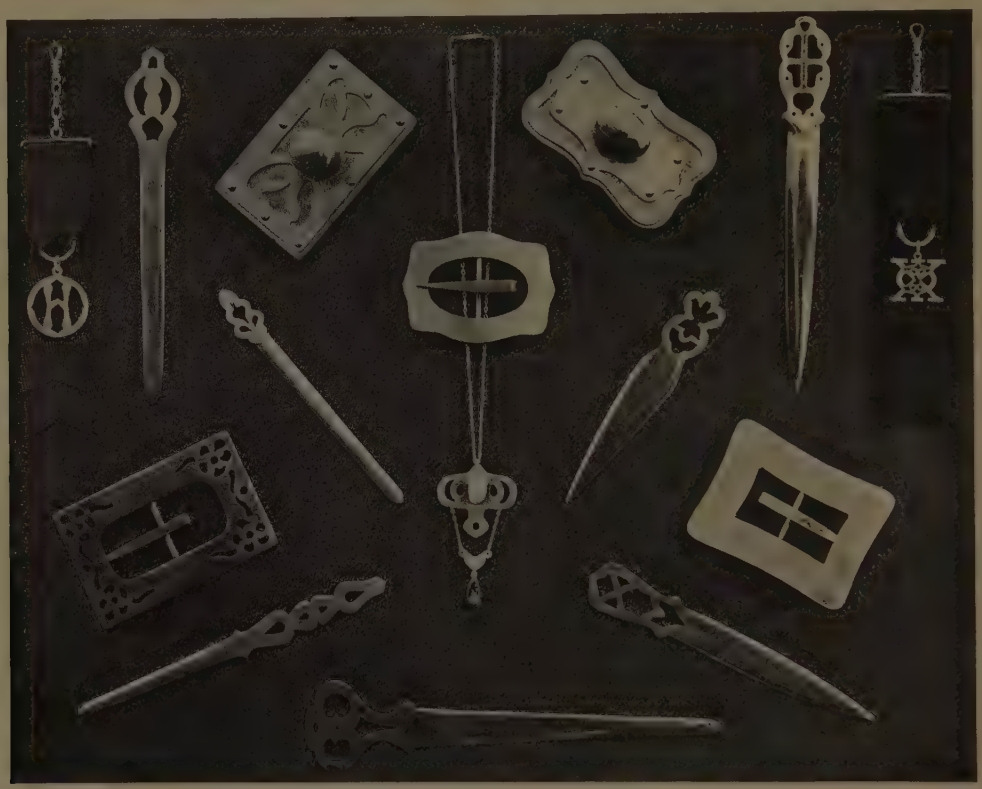


removed by dipping it into "pickle" composed of half a pint of water into which has been poured half an ounce of sulphuric acid. Never pour the water into the acid, as that might cause an explosion that would blind you. If the pickle is slightly heated, the metal will be instantly cleansed, but in any case it will not require long. The setting should now be filed down to within a little over one-sixteenth of an inch of the face of the pin. The thickness of the setting, however, must be determined somewhat by the shape and cut of the stone. The outer edge of the setting at the top must now be beveled or filed to an edge to do away with unnecessary thickness. When this has been done, the joint and catch are soldered to the back. This must be done before the stone is put in place, as the heat required for soldering the joint and catch would burn or discolor the stone. The joint and catch may be made or bought ready made. After soldering the joint and catch the pin is pickled and cleaned. The stone is next put in place and the setting burnished over the edge. This is done by first taking a small tool called a pusher, shown at Fig. 5, page 277. As the lined section of it shows, it is square on the end. With this tool the setting is pushed towards the stone, first from the four opposite points, as at Fig. 6, on the same page, and repeated in the intervening spaces until all the setting is folded snugly against the stone.

A tool called a burnisher, Fig. 7, is then taken, and with this the setting is rubbed or burnished down perfectly smooth. It may be necessary to use a file here and there. The brooch is now ready for finishing. This may be done either by polishing it or by oxidizing it. Most people prefer the natural brilliancy of polished metal, and this can be brought about with a hand brush and polishing powder, or upon a small buffing wheel if you are so fortunate as to own a foot-power lathe to which it can be attached. Oxidizing is a simple chemical process which leaves the hollows of the work stained a pleasant tone of the same color as the natural shadows of the silver. If you happen to have a really precious stone, you can thus produce a pin that will be prized.

A study of this page and of page 280 reveals two methods employed by all jewelers, ancient and modern. If you are so fortunate as to live near a good museum, you will probably find there a collection of gold, silver, bronze and brass things, including much jewelry as we to-day understand the word. There will be finger-rings, bracelets, possibly anklets, and certainly necklaces and coronets once worn by women of wealth. We must not think of the "ancients," as we are much too apt to call people of uncertain periods of the world's history, as always very rude in their civilization. The land which we call Holy — that little landing place of the nations, Palestine — has given up to us hundreds upon hundreds of gold and silver ornaments — more of gold than of silver — which were made during the period when Abraham's grandfather was young, when Palestine was, as ever, the bone of contention between the great kingdoms of Egypt and Chaldea; and when the jewelers of Damascus wrought with more than modern craft and cunning their ornaments for the decking of their horses or their women. Egypt especially seems to have had an immense output of gold ornaments, often set with precious gems; and the great age of these jewels makes those of Greece and Rome seem modern by comparison. Some of this ancient jewelry is indeed rather roughly done, but not the greater part of it, for the very contact with the finer metals seems ever to have bred a respect for them and a love of good workmanship. Upon this page are shown buckles, paper knives, watch fobs and pins. Almost every piece would find some counterpart in the ornaments of the ancients; and indeed the paper knives might be allied to the bronze weapons of defense that have come down to us from remote antiquity. Their blades have usually disappeared, wholly or in part, though some have been preserved; but their most interesting parts, the hilts and grips, whereon the artisan lavished time and care, are of close kinship to some of the designs for paper knives. The fact is that, knowingly or otherwise, we are constantly

drawing inspiration from the past, and are repeating the work of the men of old who at great cost first wrested from Nature her secrets of line and form. This page, 280, links the imagination even more strongly with the pre-Christian past. In the shapes of the paper



knives and mail openers there is a resemblance to the swords of the ancient Germans and Norsemen, while the knife shown in the lower right-hand corner might be an ancient bronze dagger taken out of some Irish peat bog. The two brooches carry us back to the earlier home of our common ancestors, in the Far East. The brooches of the pioneers of western Europe were more commonly circular in shape, often employing the spiral as a motif. The buckle and its probable parent, the brooch, were necessities and not ornaments, to the older nations, for buttons are of a more modern origin. But whatever the shape of the jewel, it was pretty sure to have one or more gems as its principal interest. And what a fascinating little kingdom is that of the precious stones; those brilliant little windows of another world, a fairy world, into which the mind peeps through their tiny panes, seeing things too fine for the grosser expression of language! And at other times, when set in pairs, how like little flashing eyes they seem, challenging your admiration of the precious metal they adorn! The colored quartzes and semi-precious gems suited to jewelry are almost without number. Indeed, what can be finer or more satisfactory than a ball of pure crystal? A notable instance of this is to be seen in the celebrated Loch Buy brooch, made in about the year 1500 of silver found on the Loch Buy estate in the Island of Mull, off the west coast of Scotland. Its center part is like a wheel with ten rounded cogs, the hub being one great rock crystal. It is surrounded by ten little turrets, each carrying a pearl on its top. The loving patience of its tinsmith designer is expressed in the wonderful filigree work soldered upon the more solid parts, which was patiently twisted of small wire, in connection with units of silver grains.

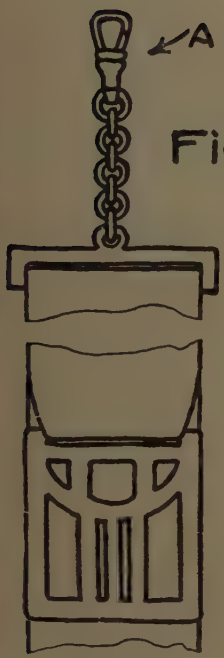
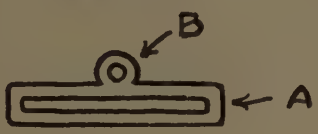


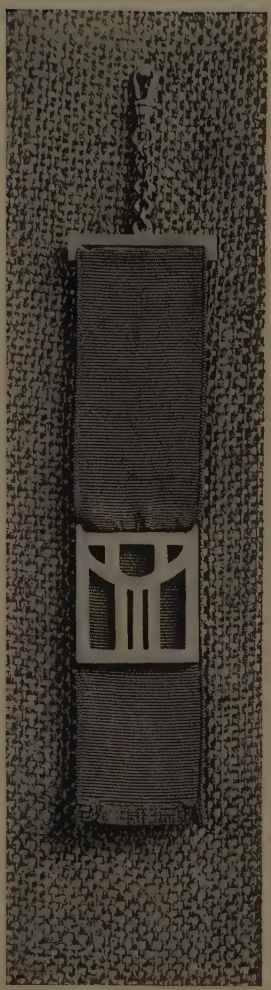
FIG. 1

FIG. 2

FIG. 3

FIG. 5





A WATCH FOB IN METAL. Every boy has a watch sooner or later; every boy must sometime have a watch fob, and frequently the girls desire them, too. One made for a girl should be smaller and daintier than a boy's. Of course your fob ought to be entirely different from every other fellow's, therefore you should make it yourself. Here you see one, worked out by a boy in a grammar school. First make several sketches and select the one which you think is the best. Place a piece of tracing paper over it and make a careful copy, being careful not to lose any part of the original sketch. With a little liquid glue diluted with water, glue the paper to the piece of copper which we will select for this lesson, and allow it to dry for a few minutes. Make a center punch for yourself out of a wire nail as at Fig. 3, and in each place that is to be cut out, make a little depression by means of a gentle tap with the hammer. This is to prevent the drill from wabbling and slipping over the surface of the metal. Keep a little distance away from the line of the design, or else the larger drill hole will be apt to cut into it. The holes are then drilled, and the openings sawed out, using a No. 1 saw blade. The saw is set into the frame with the teeth pointing outward and downward. The loose end of the saw blade is put through one of the drilled holes and then fastened in the other clamp of the frame. The metal has been placed on the piece of board that has been fastened to the edge of the bench, as shown at Fig. 4, A, page 282, and while the saw is held in a vertical position the cut is made on the downward stroke — Fig. 4, B. The up and down motion in the use of the saw may be acquired by sawing thin wood. It is well to practice this motion a few minutes before sawing the fob. In sawing all the openings keep as close to the line as possible, but be careful not to cut over it. Then saw around the outside. When all the sawing is done, files are used to true up the edges and corners of the openings and outside. The flat file is used on the straight edges and the half-round file on the curved edges. The square file may be used for cleaning corners. A little rubbing with a piece of emery paper removes any roughness. The slot in the pendant and in the

bar, Fig. 5, A, page 281, at the top of the fob, through which the ribbon is to pass, are sawed and filed in the same way. The slot in the pendant is made a little narrower than the ribbon is wide (ribbon comes in regular widths), which allows the ribbon to gather a little at that point. A projection is left at the top of the bar, Fig. 5, B, where the chain is connected.

and finished it with the needle file. The other is linked to the swivel, Fig. 1, A, page 281, and the metal part of the fob is completed. The ribbon is then put through the slot in both bar and pendant, connecting the two as in Fig. 9. Then take some black linen thread or silk, and fasten the ribbon as at A, A, Fig. 9. Rubbing the metal with emery paper leaves it quite bright, but after a few days it will turn a beautiful bronze color. If you have not already built a bench, this is a good time to tell you how. Any stout old table will do, or a plank top two feet by three, on legs or brackets. A $2\frac{1}{2}$" bench vise; a 4" jewelers' saw frame (or a bracket saw); one dozen No. 1 metal saws and a drill; a No. 60 twist drill, straight shank; one half-round needle file, one square needle file, and one equaling file, each $5\frac{1}{2}$"; one pair $4\frac{1}{2}$" chain pliers and a sheet of emery paper No. OO, will furnish your bench. Materials for the fob are a piece of sheet copper $1\frac{3}{4}$" x $2\frac{1}{2}$", No. 12-gauge; 12" of No. 18 soft copper wire, and a copper swivel. It requires 12" of $1\frac{1}{4}$" ribbon.

FIG. 9

FIG. 4

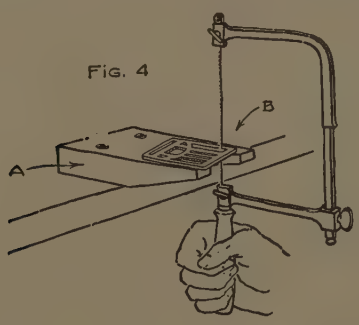


FIG. 6

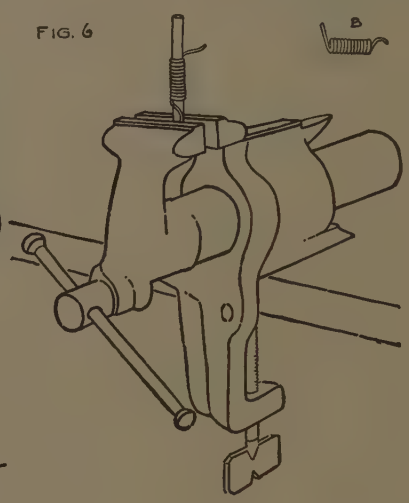


FIG. 7

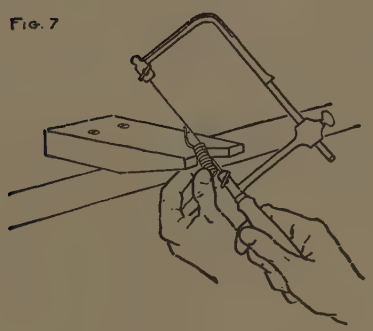
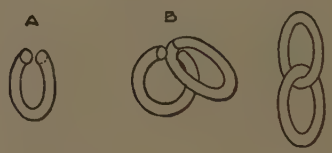


FIG. 8



To make the chain, take some No. 18 wire, and, with one end of the wire fastened in the vise together with a wire nail about $\frac{1}{8}$" in diameter, wind it around the nail as shown in Fig. 6. After about ten turns have been made, remove the nail and wire from the vise and slip the wire off the nail, leaving it in the shape of a small spring as at Fig. 6, B. Holding the coiled wire as at Fig. 7, saw the links apart, and when separated they will look like Fig. 8, A. With the chain pliers open the links as at Fig. 8, B, wide enough to admit another link, and then close again as at Fig. 8, C, and so on until the required length is made. About seven links make a chain long enough to hang well. One end of the chain is then linked through the projection left at the top of the bar, through which you have drilled a hole

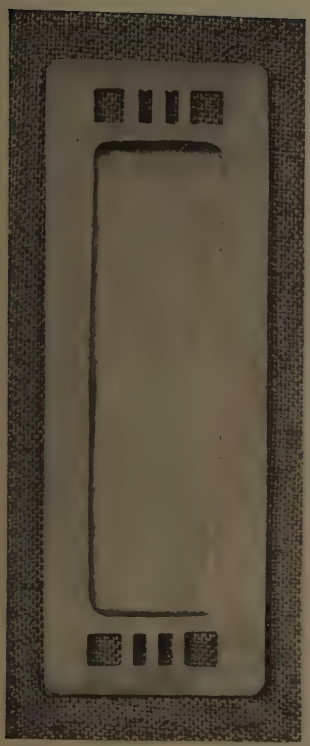


FIG. 1.

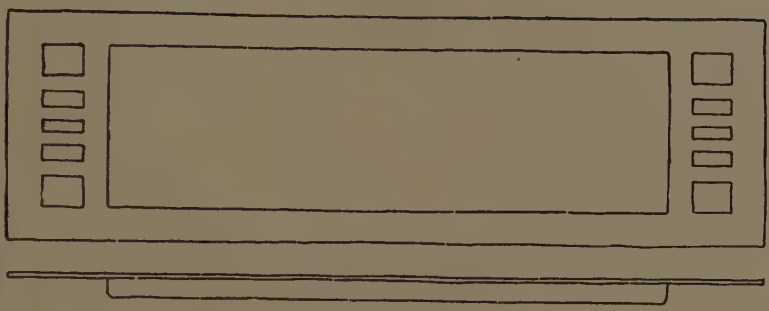
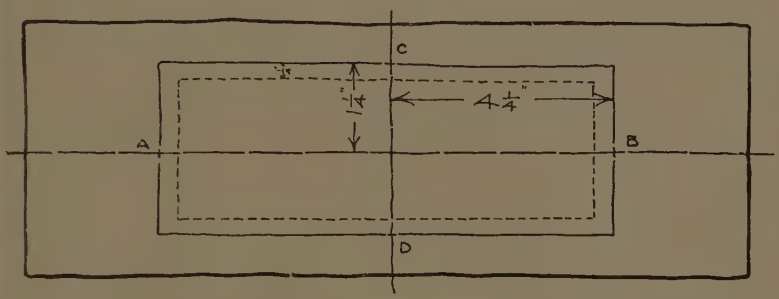


FIG. 2.



A METAL PEN TRAY. For this you will need a piece of sheet copper 11¾″ x 3¾″ of No. 20-gauge. A lump of liver of sulphur and a quarter of a pound of powdered pumice. The kind of hammers and the mallet needed are shown on page 284. As penholders vary but little in length and as any pen tray is designed to hold three or four penholders, the best dimensions for the tray are 8½″ long in the tray part, by 2½″ wide, and 11½″ x 3½″ for the whole finished tray. As to design, your outline may be either regular or irregular, and some decoration may be applied to the sides if desired. It sometimes adds interest if a little piercing, embossing or enameling is done at either end, if kept simple in detail. Making a pen tray is not a difficult problem. The idea is to take a rectangular piece of sheet metal and to stretch or expand it in the middle so that the tray proper may be shaped from the expanded metal while the sides and ends are left the original thickness. The design for the pen tray described here is illustrated in Fig. 1. Our piece of material must measure 11¾″ x 3¾″, and is of 20-gauge. Draw the diameters. Lay off 4¼″ on either side of the short diameter, and 1¼″ on either side of the long diameter as shown at A, B, and C, D, Fig. 2. Draw parallel lines through A and B and C and D, thus making a rectangle 8½″ x 2½″, which is the size of the tray proper. These lines should be drawn in pencil first and then made permanent with a scratch awl. Now measure ¼″ inside of the rectangle you have just made and you will have another rectangle, 8″ x 2″. These lines must not be scratched but left in pencil, as shown by the dotted line, Fig. 2. The metal inside of the dotted line is to be stretched to form the hollow part of the tray. This is done with the hammer shown at Fig. 3, A, page 284. Place the metal over a flat metal surface and using the domed head of the planishing hammer shown at A, go over the surface inside of the dotted line. This stretches the metal in the center where we want to get depth for the tray. When this has been done evenly all over, the metal should be softened, as the hammering has hardened it. This softening is called annealing, and is done by heating the metal red hot and allowing it to cool either naturally or by dipping it in cold water. The heating is ordinarily done by the blowpipe,

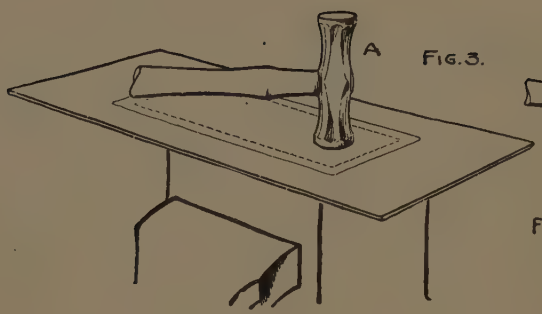


Fig. 3.

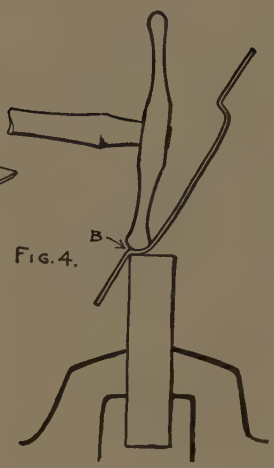


Fig. 4.

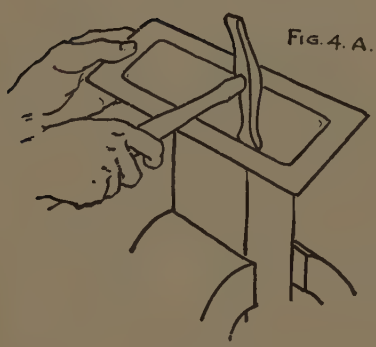


Fig. 4. A.

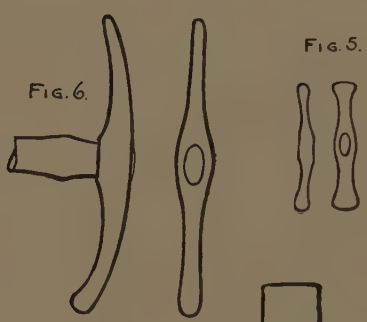


Fig. 6.

Fig. 5.

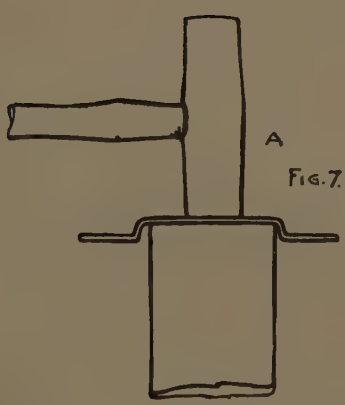


Fig. 7.

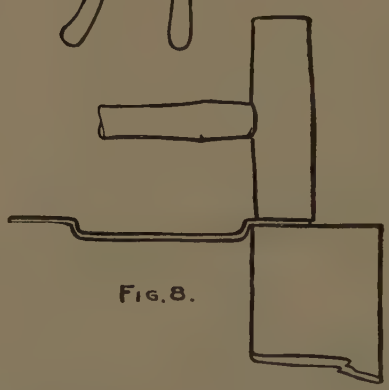
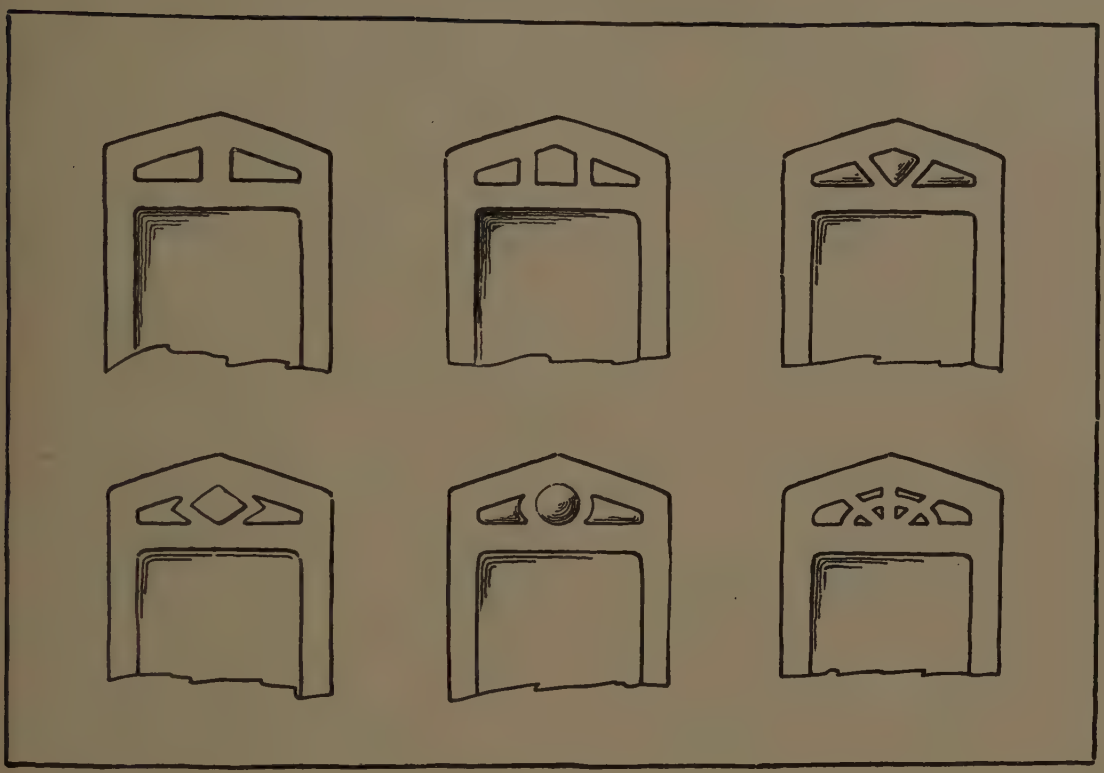


Fig. 8.

but if one is not at hand, the metal may be placed over a gas plate or in an ordinary kitchen stove on top of the hot coals.

It will be necessary to anneal two or three times during the making. Next take a piece of hard wood about 4″ x 4″ x ⅞″ with square edges (maple is best), and place it in the vise so that the grain of the wood runs vertical. Place the back of the metal against the block so that the edge of the block is exactly below the line B, Fig. 4. With the hammer shown at Fig. 5, go around the scratched line, sinking or driving the metal away from the surface as shown at Fig. 4, A. To work around the corners it is necessary to use a hammer like Fig. 6. This operation is to be repeated until the required depth is obtained. A good depth for a tray of this size is about 5/16″. The bottom of the tray will be more or less irregular, which depends on the care we take in hammering. To even the bottom, reverse the tray and place it over a thicker block of wood, as at Fig. 7, about 4″ x 4″ x 2¼″, and use a mallet, as Fig. 7, A. The edge of the tray should be kept level. This is done by placing it against the edge of the block, Fig. 8, and hammering it lightly several times during the making. After shaping the hollow part of the tray as desired, true up or planish the entire surface of the tray, using a hammer like Fig. 5. As this hammer gives a long narrow mark, care should be taken to keep the marks parallel. In planishing, a metal block is used in place of the wooden one.

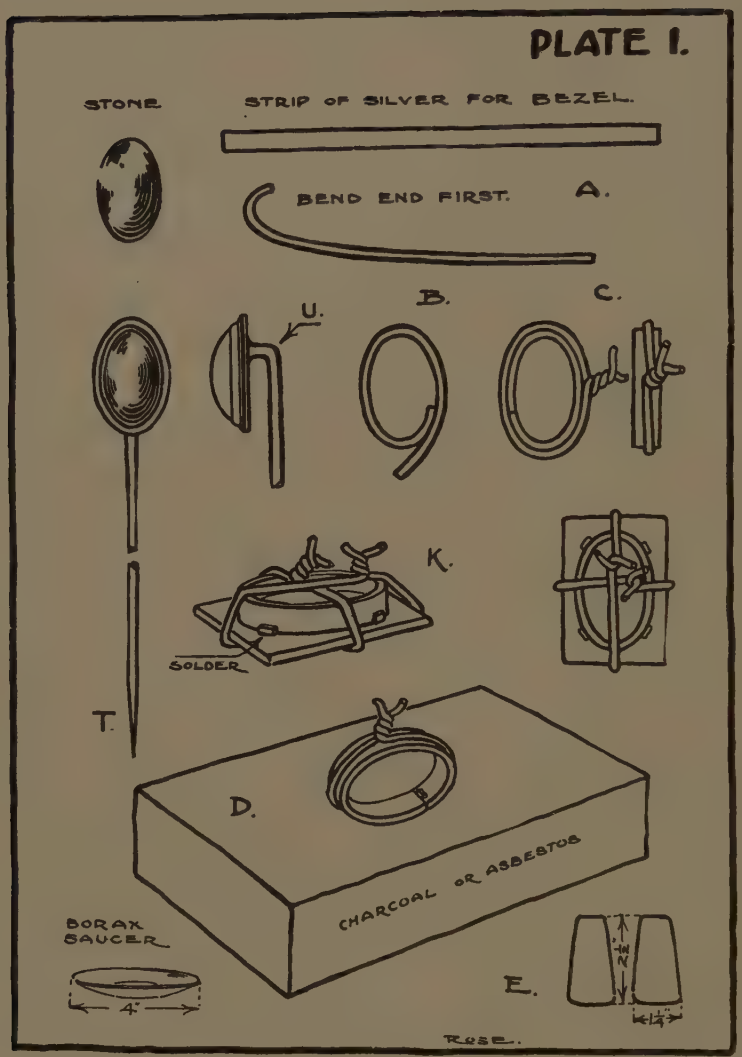
We are now ready to finish the outline of the tray and apply the decoration. The design for this tray calls for a flat space of ½″ from the edge of the sunken part of each long side, so we measure this distance, draw a pencil line and cut to the line with the shears. By referring again to our design we find that at either end there is a flat space of 1½″ called for, so the measurement is made and the ends cut to that length. We also notice that the decoration in this case is to be in perforation, or piercing, at each end. Tracings are made from the



pattern and glued to the under side of the tray ends. Drill holes where you wish to set the saw, and proceed as directed on page 281. With the files and fine emery paper or emery cloth, finish the edges.

Sometimes the metal takes on beautiful colors during the making of the tray, resulting from the annealing, but more often they are uninteresting, and when so, it is necessary to clean the object. The solution called "pickle," used for this purpose, is made of one part of sulphuric acid to fifteen parts of water. It may be used cold, but is more effective if used hot. Again remember, pour the acid *into the water*, not the water into the acid, lest you produce an explosion. When used hot a copper dish is necessary. The object being placed in the dish with enough water to cover it, the pickle is allowed to come to the boiling point. The pickle is then poured off and the object rinsed in cold water. After cleaning, the tray may be colored in a variety of ways, but one that has proved satisfactory is to dip it in a solution of liver of sulphur and water, using a lump of liver about the size of a half-dollar and one quart of water. Heat the solution and dip the object while hot. This will turn the tray black, but after rinsing in cold water, the color of the metal is brought out by rubbing with fine powdered pumice stone, removing as much or as little of the dark color as desired. This treatment is often called oxidizing. Rinse in clean water, dry by laying in fine sawdust, and rub well with a soft cloth. Another method of coloring is to coat the tray with ordinary machine oil after it has been thoroughly cleaned, and heat it very slowly and evenly upon a stove or over a gas plate. This operation should be watched closely and when the desired color is obtained remove the tray and let it cool naturally. Of course a pair of tongs is necessary to handle the hot tray. The colors are beautifully iridescent, and will last a long time, though they are not permanent.

Copper is one of the most interesting of metals: as you know, it is often used for the bottoms of wash boilers, where it is especially valuable because, like brass, it will not rust.

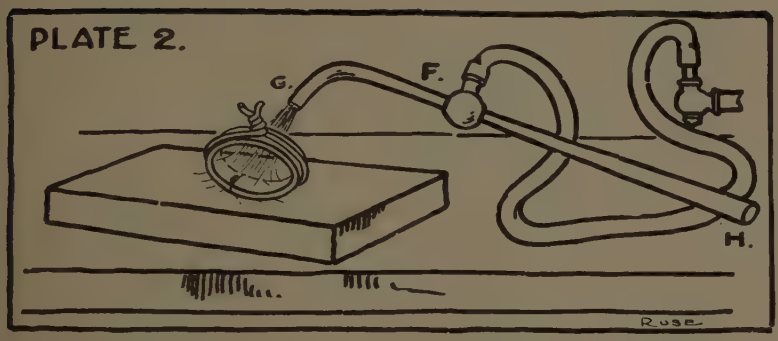


at A, Plate 1, then as at B. Fit it close, as at B, clip off the end, and bind with the wire as at C. At D it is shown ready bound upon the asbestos board or a cake of charcoal, in position to solder. Clip off a tiny bit of solder, and mix the borax. Put in a saucer about half a teaspoon-

A SCARF PIN IN METALRY. For materials you will need a semi-precious stone, a piece of sterling silver No. 18-gauge, $\frac{5}{8}'' \times \frac{7}{8}''$, a piece of No. 22-gauge $\frac{3}{16}''$ wide and 3" long and a piece of No. 16-gauge sterling silver wire. A small piece of easy-flowing silver solder; 12" of No. 28 iron binding wire; one ounce of tripoli (for scouring); one ounce of rouge (for polishing); one ounce of powdered borax, for soldering; and a piece of asbestos board to hold the metal while under heat. Cut the strip for the bezel or belt that holds the stone in place about $\frac{1}{32}''$ wide and long enough to go around the stone. Using the round-nosed pliers, first bend one end as

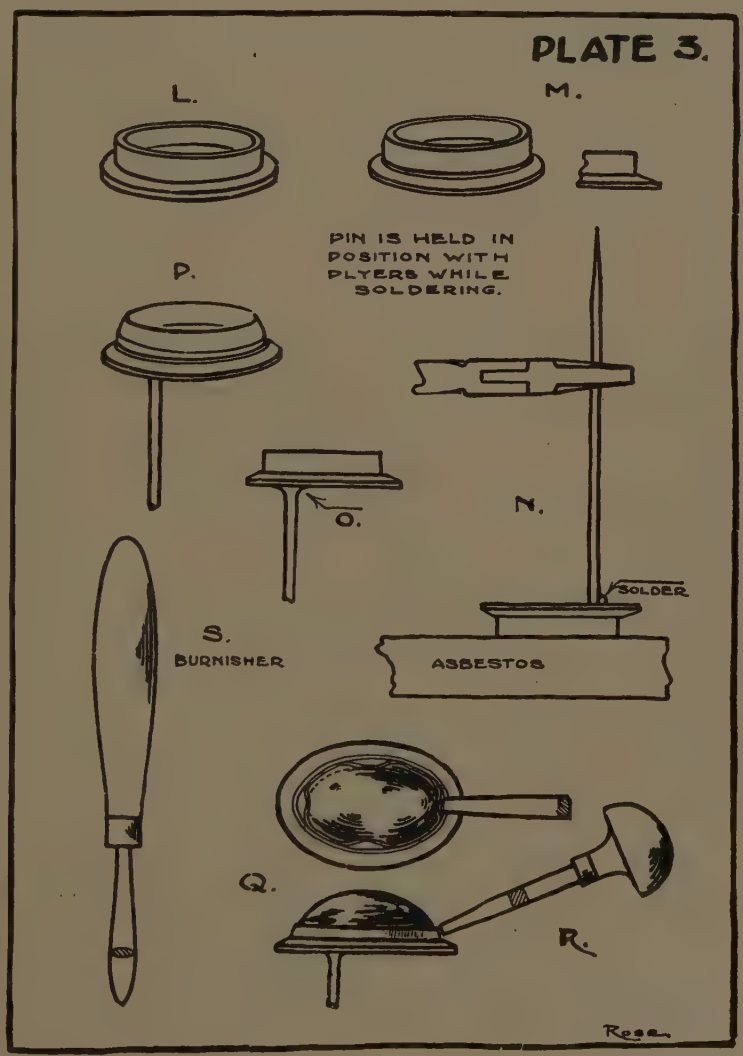
ful of borax and add to it twice as much water. Take a little of the mixture on a spoon and with the back of the bowl gently mix it to a thin paste on a block of wood shaped like Fig. E.

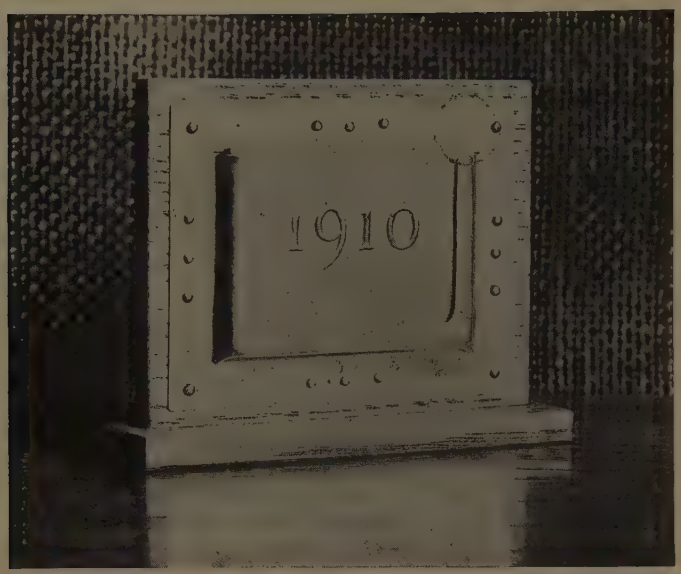
With the brush, coat the parts to be soldered, and drop the solder into the saucer of borax. Place the solder on the joint, do not handle the parts, but with the blowpipe as shown at Plate 2, page 287, apply the flame, taking care not to overheat or blow so hard as to chill it. A spirit lamp may take the place of gas flame. Remove the wire, and put the setting in pickle. Rinse in cold water and dry. File off any unevenness of solder, and it is ready



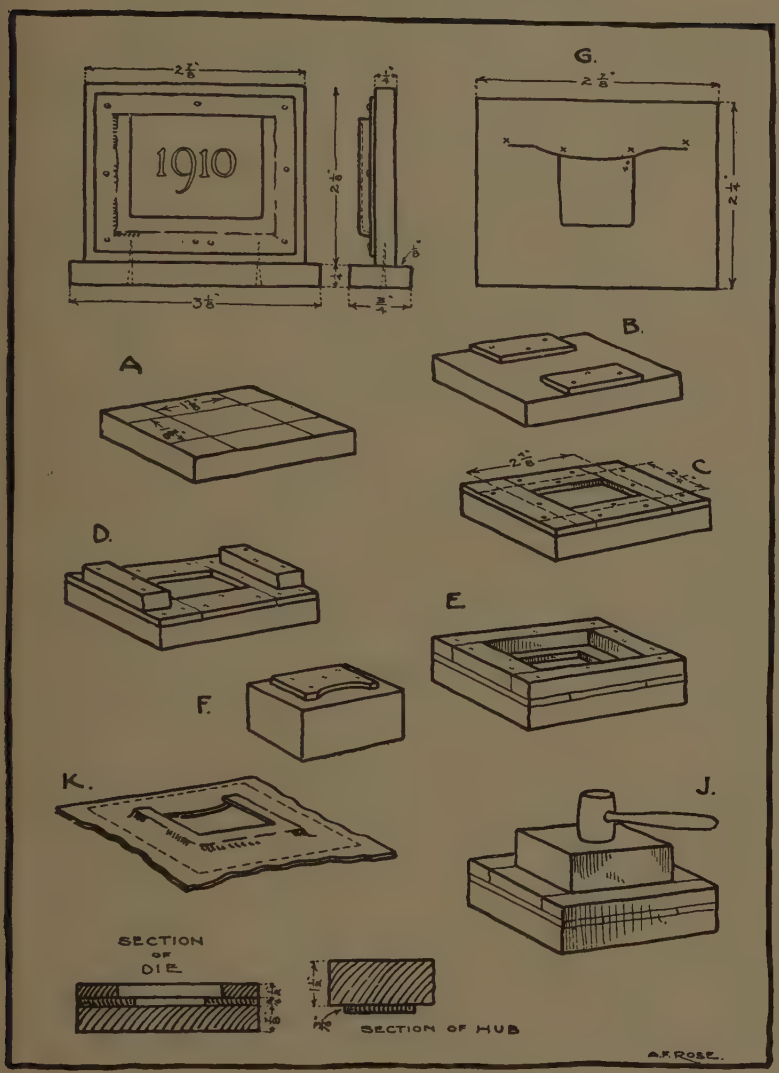
and forcing the bezel or setting against the stone, (see illustrations on this page and on page 278), and gradually working all of the edge against its surface. The burnisher, S, is then taken, and by rubbing vigorously with it, the thin edge is evened flat and brightened. Burnish until perfectly smooth. Point the pin and polish the whole. Finally bend the pin with the round-nosed pliers.

to set upon the backing. This is cut from the thicker metal, and the setting should be fastened to it as in Fig. K, page 286, the solder being applied as marked; four little pieces are used. The soldering proceeds as before, the pickling is repeated and the back is then cut parallel with the setting, leaving a full sixteenth of an inch all the way around. This should be done with the saw. The joint of the bezel and backing is now filed up and the edge of the backing filed true and slightly beveled, as at M (see especially the detail shown at the right). Straighten the wire for the pin and solder to the back of the setting, a little above the center, N. Clean the place where the joint is to be, coat with borax, and place a small piece of solder close to the wire as at N, while the pin is held in position with the pliers. The flame is applied till the solder flows all around, making a strong joint as at O. Pickle again for the last time. File the outer edge of the bezel to a bevel at the top, P, Plate 3, to reduce the thickness. Put the stone in place and burnish the bezel over the edge. This is done by first taking the pusher,

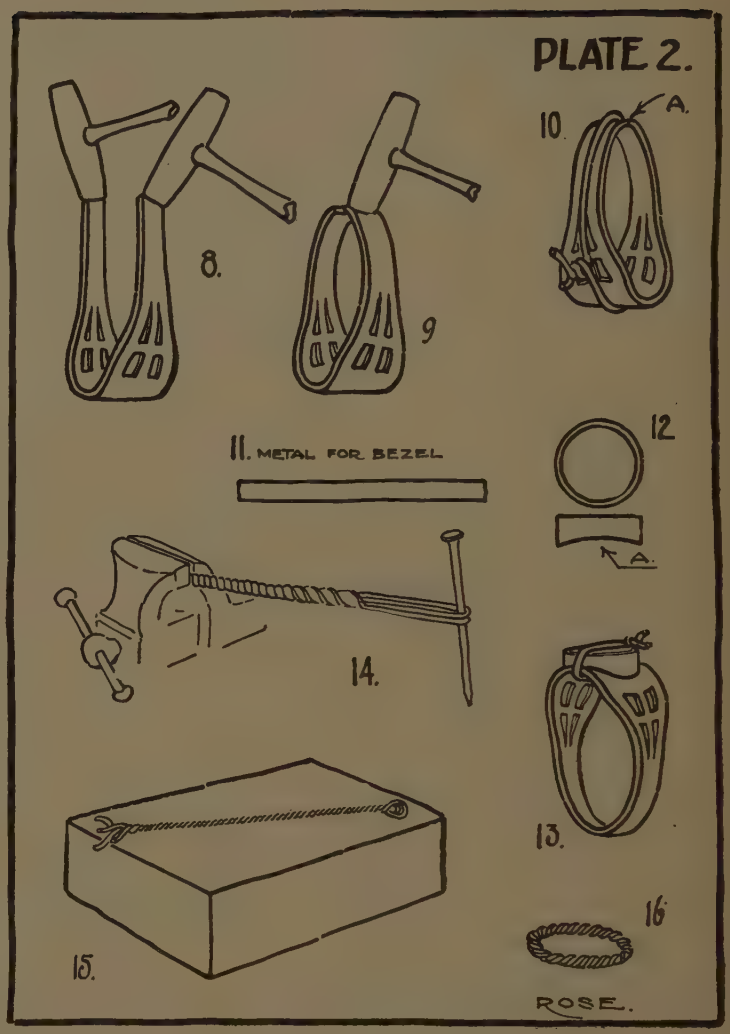




A CALENDAR HOLDER. One of the first things you think of in designing a holiday gift is apt to be a calendar. The calendar and holder here described is a unit in itself and not a mere adjunct to something else. Made and inclosed in a neat little box, it is a gift gladly received by anyone. This holder may be made for any size calendar, but a good size would be for one of the smaller varieties, say $1\frac{3}{4}'' \times 1\frac{3}{8}''$. The base of the holder would measure $3\frac{1}{8}''$ wide by $\frac{3}{4}''$ thick, and it would stand only $2\frac{1}{8}''$ high. Let us take these for our dimensions, and see how compact and dainty an ornament for the desk we can combine with a practical calendar. It is one of those good designs worthy to survive. You will need a mold or die into which the holder is pressed into shape. A plunger or hub is also required, to fit the mold, and for driving the metal into it. For the die you will need: 1 piece of hard wood, $\frac{7}{8}''$ stock, $6'' \times 5''$; 2 pieces $\frac{3}{16}''$ stock, $1\frac{7}{8}'' \times 1\frac{1}{2}''$; 2 pieces of $\frac{3}{16}''$, each $4\frac{3}{8}'' \times 1\frac{1}{2}''$; 2 pieces of $\frac{1}{2}''$ stock, $2\frac{1}{4}'' \times 1''$; 2 pieces of $\frac{1}{2}''$ stock, $4\frac{3}{4}'' \times 1''$. For the hub: 1 piece $2\frac{7}{8}'' \times 2\frac{1}{4}'' \times 1\frac{1}{2}''$; 1 piece of $\frac{3}{16}''$ stock, $1\frac{3}{16}'' \times 1\frac{5}{16}''$. Take the piece $6'' \times 5'' \times \frac{7}{8}''$ and square lines on it as at A, page 289, having the center space measure $1\frac{3}{8}'' \times 1\frac{7}{8}''$. Place the two pieces of $\frac{3}{16}''$, $1\frac{7}{8}'' \times 1\frac{1}{2}''$ on piece A, and nail in place as at B. Use $\frac{1}{2}''$ wire brads, not tacks, and drill holes to prevent this thin stock from splitting. Next take the two pieces of $\frac{3}{16}''$, $4\frac{3}{8}'' \times 1\frac{1}{2}''$ and place them as shown at C. Now square lines again across the top as shown at C, having the center space measure $2\frac{7}{8}'' \times 2\frac{1}{4}''$. Take the two pieces of $\frac{1}{2}''$ stock, $2\frac{1}{4}'' \times 1''$ and place them on as at D, and so on with the two pieces $4\frac{3}{4}'' \times 1'' \times \frac{1}{2}''$, leaving the die when finished as shown at E. To make the hub or plunger, take the piece of stock $2\frac{7}{8}'' \times 2\frac{1}{4}'' \times 1\frac{1}{2}''$ and nail the piece $1\ 1\frac{3}{16}'' \times 1\ 1\frac{5}{16}''$, of $\frac{3}{16}''$ stock, to one side of it, being careful to have it nicely centered as at F. You now have your die and hub ready to make the first impression for the holder. Take a piece of 26-gauge copper $2\frac{7}{8}'' \times 2\frac{1}{4}''$ and lay out lines on it as shown at G (upper right hand). Drill a hole at H and with the small piercing saw cut out the square center. Also make the two cuts at XX. Next place the metal on the die and the plunger as shown at J. With the mallet drive the metal into the die, forcing it into the shape shown at K. The piece of metal you start with is larger than the finished size, to allow for contraction. Although the edges are true when you begin, they are very irregular when taken from the die, and must be trimmed to the required size as shown by dotted lines K. The edges will also crimp a little, but this is removed by placing the edge over a flat surface and hammering lightly. All edges should be finished with the file and emery paper. The holes are then drilled for the rivets. The upright is now fastened to the base either with screws or nails, and in either case the awl or drill should be used to prevent splitting. The upright and base may now be stained or left in the natural wood color and the holder may be oxidized or left bright. After staining and coloring as desired, the holder is fastened to the upright. Place rivets in the top corners first, being careful to get the space between the edge of the metal and the edge of the upright equal on all sides. When this has been done, the rest of the rivets may be placed as desired; but if grouped in some way they will add to the interest and beauty of the whole.

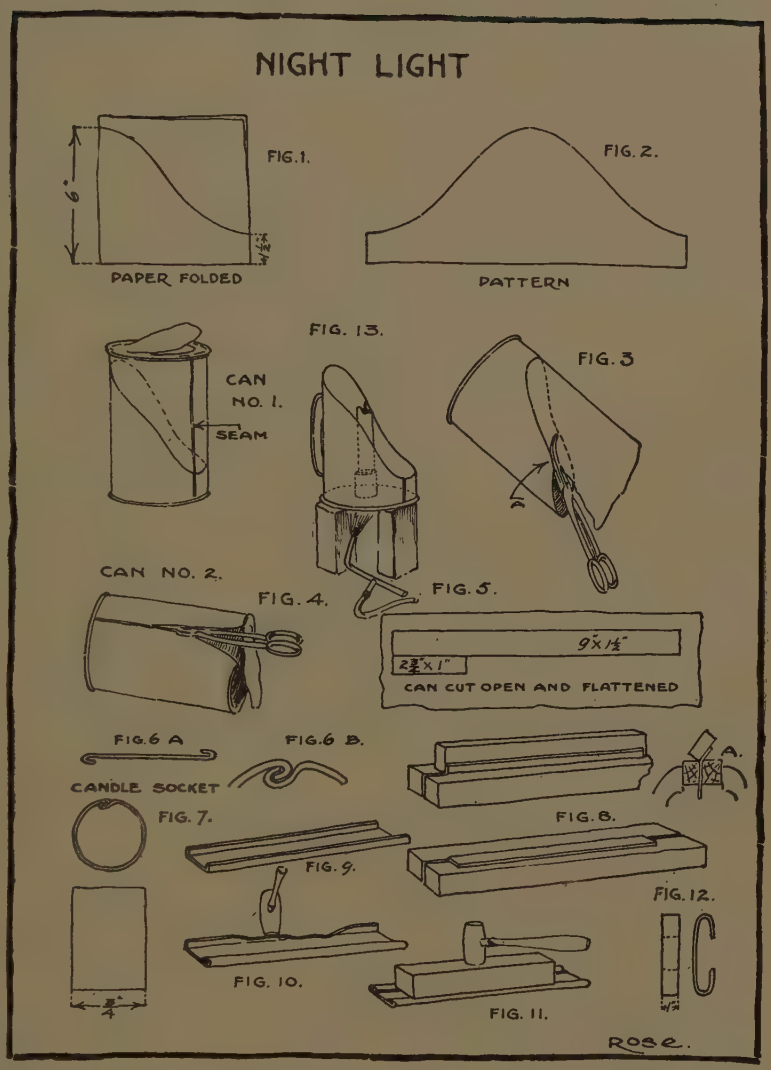


In the photographic illustration of this calendar and holder, the date "1910" appears as if also wrought in the metal. This is not the case, for the date was the clever drawing by the designer to suggest the style of an embossed letter, and was painted in wash upon a card. But it is well to remember that such a legend might easily be done in metal, in repoussé, as it is called, the French word meaning literally "humped up." By leaving more room at the base, the numerals of the year might be thus introduced upon the metal. Calendars were not in common use until the last quarter of the nineteenth century. Before that time the standard office calendar — there were practically none in the home — was a revolving affair, with the day, month and year shown upon a vertical face through three openings. It required a system of rollers to operate it, and it was often out of order. It had never occurred to the mind of man that there was no need of saving the monthly record of days and moon-facts; that insight, when it arrived, made possible a calendar pad such as we now have everywhere. In the old days the family depended entirely for its date-keeping upon the almanac, and this, in New England at least, was for many years the "Old Farmer's Almanac," founded and edited by Robert B. Thomas. According to the country tradition held by those who reverenced his memory and swore by his statements, he used to lie on his back in a pig's trough to study the stars. Doubtless this rumor at first started because the good man viewed the wonders of the heavens through a telescope held in a trough which no pig ever fed from. Benjamin Franklin founded his remarkable Poor Richard's Almanac in 1733, dispensing astronomical knowledge and sound practical philosophy at the same time. The name "calendar" comes from the Latin *calendarium* — meaning an account-book, and derived from *calendae*, or first of the month, on which day accounts were payable. The ancient Egyptians had a year of twelve months of 30 days each, but the early Romans had but ten months until Numa Pompilius added February and January, afterwards transposed to the present order.



A FINGER RING. At last we have a problem for you to work out in simple metalry which sums up most of our ideas about jewelry, the ring. The stone must be taken as the central feature of the design and, as in the case of the scarf-pin, page 286, made the point about which and up to which you must work. We will use the simple cup setting with which you are familiar in the other problems. For the ring we shall need a strip of 18-gauge silver $2\frac{3}{8}$″ long and $\frac{9}{16}$″ wide. Draw a pattern that pleases you for the piercing, and make a careful tracing of this for gluing to the silver. Drill and saw out the design as described on page 277, only this time you must use a finer saw for the smaller openings, a No. OO size. The drill also must be fine, a No. 60. A square needle file and a knife edge needle file are needed to finish the little openings. To bend the ring-strip into round shape, bore a $\frac{3}{4}$″ hole through a small block of hard wood about 2″ thick and then saw it in two across the opening, cutting the opening on a diameter. Set the block sideways and lay the ring-strip across the groove thus formed. With a short piece of $\frac{5}{8}$″ dowel laid across it lengthwise of the groove, strike with a mallet and force the ring down into the groove. Then strike gently the upturned ends as at Fig. 8, and gradually bend it into shape. When the ends touch as at Fig. 9, bind as at Fig. 10, and solder as described on page 286. At Fig. 11 is shown the strip of silver designed for the bezel to hold the stone. This is from 24-gauge silver; cut it the right length to fit the stone, bend it around it, and cut and solder. Now comes a bit of finer craft, the shaping of the under side by filing to fit the head of the ring, as at Fig. 12; but this you can do with a little patience. Fit it, solder, and then pickle. For the little twisted fillet to go around the base of the setting, take some 24-gauge silver wire about 12″ long, and double it twice, twisting it as shown at Fig. 14. Coat it with borax and lay it on your asbestos board or charcoal block. Put three or four small pieces of solder at equal distances along it, and heat to the point of letting it flow along the wire. Fit to the setting, and cut and bend into a ring as at Fig. 16. Solder the ends, solder to the setting, and pickle. File the bezel to the right height and thinness, set the stone and polish the ring. Fine emery cloth, tripoli and rouge are used to scour and polish. If desired, it may be oxidized instead, as described on page 285.

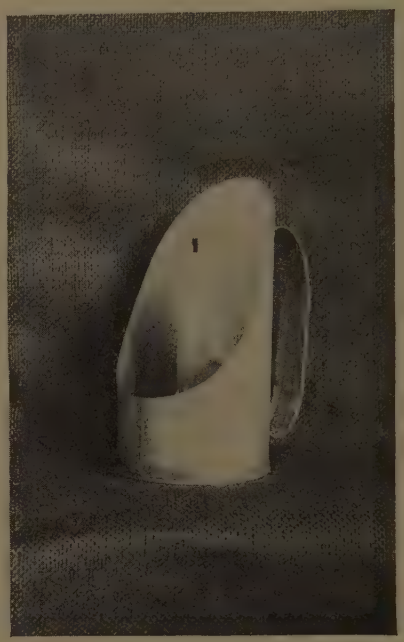
A NIGHT LIGHT. Two discarded tin cans, a little soldering fluid, and some soft solder are your materials, and as for tools you will not use one half of those you have. Cut a pattern from heavy wrapping paper. Fold and cut it as Fig. 1. It will unfold as Fig. 2. Now fold it around the tin can No. 1, with the seam of the can at the front or open side of the lamp form. Hold in place firmly and draw its outline with a lead pencil. With the curved tinsmith's shears begin at the top and cut this out, Fig. 3. In using these shears their cutting edge should come into contact with the line to be cut at but one point of that edge, as at A in Fig. 3. File and emery the resulting edges to a smooth finish. From can No. 2 you are now to cut pieces for the handle and candle socket. Cut it down the seam at the side, Fig. 4, and around the bottom so that the tin may be straightened out in a flat sheet, Fig. 5. As the diameter of the candle to be used for a light is ¾″, the diameter of the socket must be ¾″, so a strip is cut as long as three times the diameter plus ½″, which is allowed for lapping, and an inch wide, which is to be the height of the socket. The ends of the strip are turned, as shown at Fig. 6, A and B, and brought together and clinched, as at Fig. 7. The strip for the handle is 9″ long and 1½″ wide, ¼″ being allowed on either side to turn in, in order to give the handle a little more thickness and a finished edge. To turn the edges of the handle, take two pieces of wood about ⅞″ square and 10″ long, and place the strip for the handle between these pieces, having the strip project above ¼″ as at Fig. 8, and fasten them in the vise.



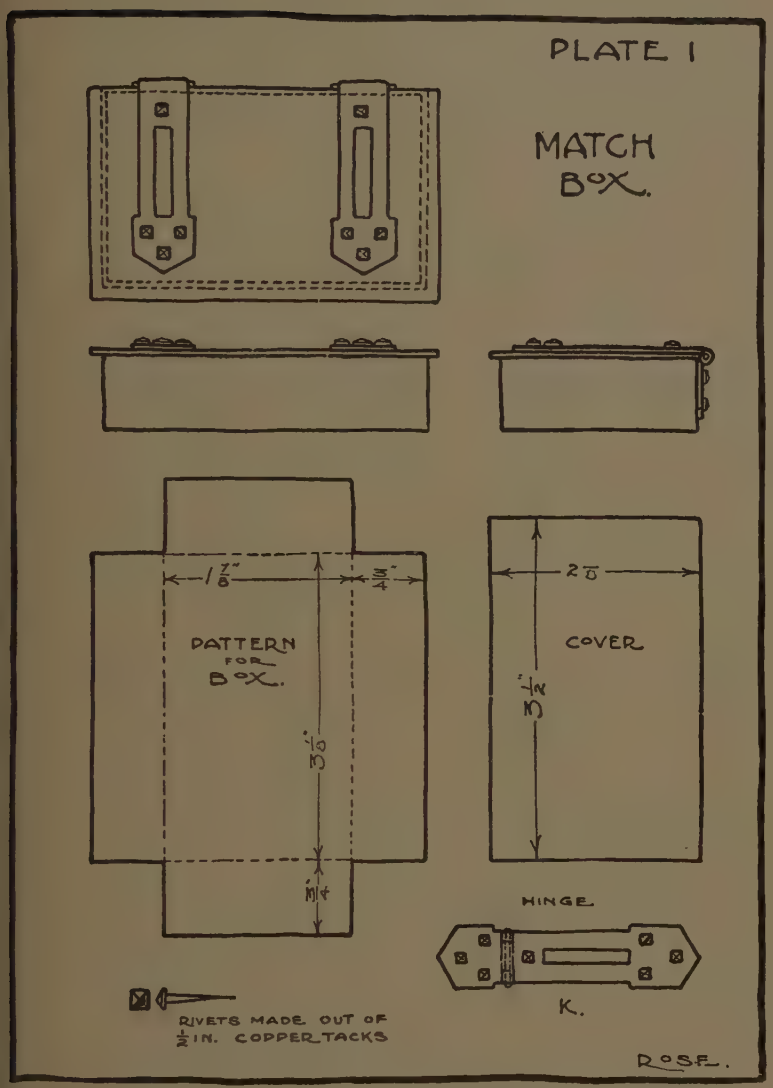
Now take another piece of wood about the size of the other two, place it as shown at Fig. 8, A, and turn the edge over at right angles. This is done on both edges, shaping it as at Fig. 9. With the mallet, turn these edges over almost flat, Fig. 10.

It may not bend evenly at all points, but by placing one of the ⅞″ strips as at Fig. 11, the edges can be trued up with the mallet. The handle is next bent into shape as at Fig. 12. A broom handle or a piece of gas pipe or steam pipe will answer

for a form to bend it on, though it is easily bent with the fingers. The handle and candle socket are now to be soldered into place, and as the light is made of tin, you will find soft solder sufficient. Enough soft solder and soldering fluid can be bought from any tinsmith for this job for three or four cents, or it can be got at any hardware store.

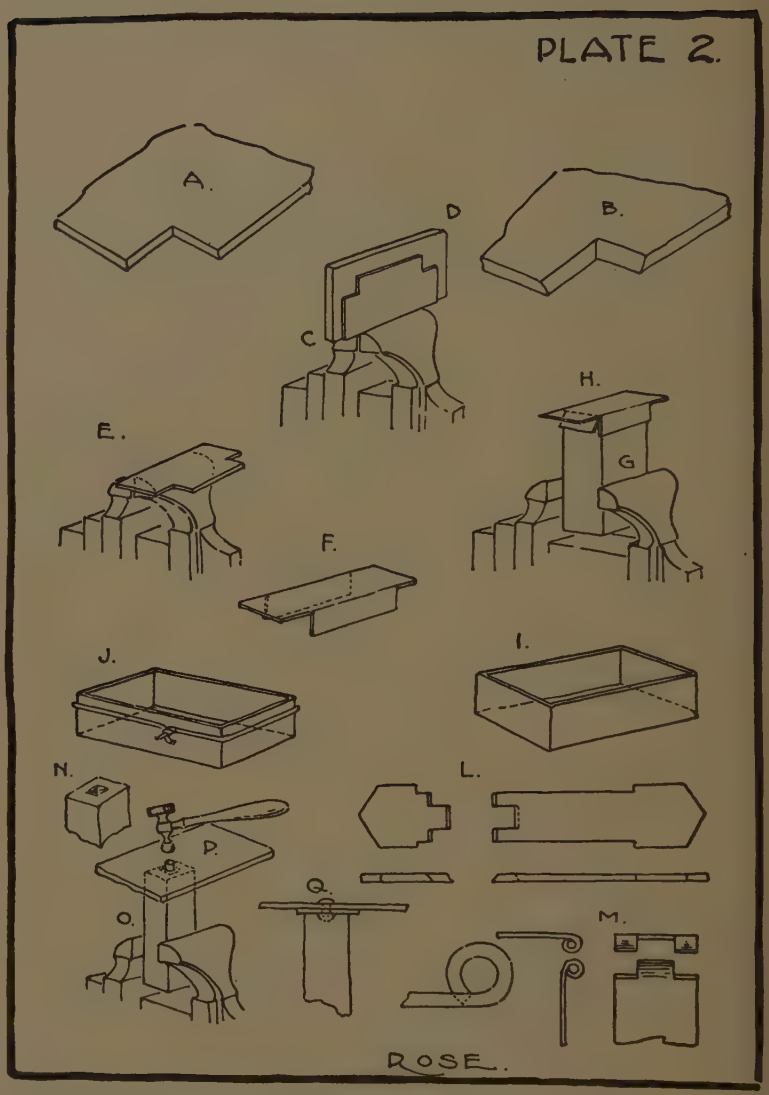


To solder the socket, first scrape the tin bright where the socket is to be placed and coat the surface with the soldering fluid. Then put the socket in place and put two or three pieces of solder next to the edge, on the inside of the socket. A soldering iron would be the proper thing to use for soldering this, but as we already suppose you to have the small blowpipe we can make that do very well. When everything is ready place the light on two bricks or charcoal blocks as at Fig. 13, and heat the center part of the bottom with the blowpipe until the solder flows around the joint. Soft solder fuses at a very low temperature, so care must be taken not to get it overheated. The handle is soldered in the same way. Clean the tin where the handle is to be joined; coat with the soldering fluid, and hold the handle in place with binding wire. Place a small piece of solder at the bottom of the handle and apply the flame on the inside. After the soldering is all done, clean the light with some kind of metal polish or powdered pumice and water, and it is ready for use. You will be surprised at the amount of comfort one of these night lamps will afford. In these days of electric switches we are often at a sore loss for a ready light when we are away for a few days where electric service is lacking. This night light is a very old shape in its design, and doubtless some such form may have shielded from windy gusts the light carried by a peasant of old Chaldea or ancient Egypt. Man soon finds the best shape and size for his utensils, start him where you will. The most handy form will usually be found to be among the oldest. If you are like most folks, older as well as younger than you, you have had the queer experience of awaking in the night, suddenly, no one knows why, to find yourself — where? Yes; and how? — and one might almost add, who?—for you doubt your own identity; the head of the bed is exactly where the side of it should be by rights. How on earth you and it ever came so are questions that press upon you with foolish insistence. The windows are not of the slightest assistance to you, and vain is the help of the headboard, for which you paw frantically about, and which you fail to touch. Where the footboard should be, a firm wall of strength, there is only space, and the farther you reach for it, sweeping the black air with wild gestures, the more certain you become that there is a great open void where once was solid furniture, and that any farther reach on your part will capsize you into space. Ah, then, then it is that the handy night lamp becomes your friend and guide — if you can find it! And by beginning a careful and thoughtful survey of the couch you are lying on,— of that one fact you are sure, at any rate,— you can usually arrive at the headboard, after a suitable interval, and can locate, on the stand next it, the night lamp. You can then light its candle without fear of an explosion, and have light on the subject of what ails you and why you wake up. Yes, all honor to the night lamp! The candle is the handiest thing known for light. It cannot explode, and you can blow it out without fear of asphyxiation. It must be happy to find itself back in an electric-lighted house, and depended upon when its brilliant rival goes on strike! With a candle of proper length it is also a shield to the eyes against the glare of the candle's light.



A METAL MATCH BOX. On a piece of 20-gauge copper lay out or draw the pattern as shown on Plate 1, first using the pencil and then a scratch awl to insure permanency, going over the lines lightly on the metal. With a No. 3 saw the corners are cut out, being careful to keep on the outside of the line and to allow a little for filing. The edges that form the corners are next filed, being careful to keep all edges straight and at right angles, Fig. A, Plate 2. Otherwise your box will not have perpendicular sides. After the corners are carefully filed, the edges at B, Plate 2, are beveled a little to form a miter, which, when soldered, makes a much better joint at the corner. The sides and ends of the box are next bent at right angles to the bottom. To bend the sides, place the metal in the vise as shown at C, page 294, and place a piece of wood a little larger than the metal for the box at the back, as at D; taking hold of the wood at either end, bend the metal towards you till it is at right angles to the part that is between the jaws of the vise as at E. The piece of wood helps to bend it more evenly. The metal is now in shape as at F. To bend the ends, place a block of wood about $1\frac{7}{8}'' \times 2\frac{3}{4}''$, and 3″ or 4″ long, in the vise as at G. Now place the metal over the top of the block as at H, and with a rawhide or wooden mallet, bend the ends at right angles to the bottom, so that it is now in appearance as at I. The corners should be brought well together, having the metal touch at all points. If the metal is hard, it should be annealed before bending, but if it is annealed after the corners are filed into shape the part to be soldered must be filed a little more, to remove the black scale caused by the heat.

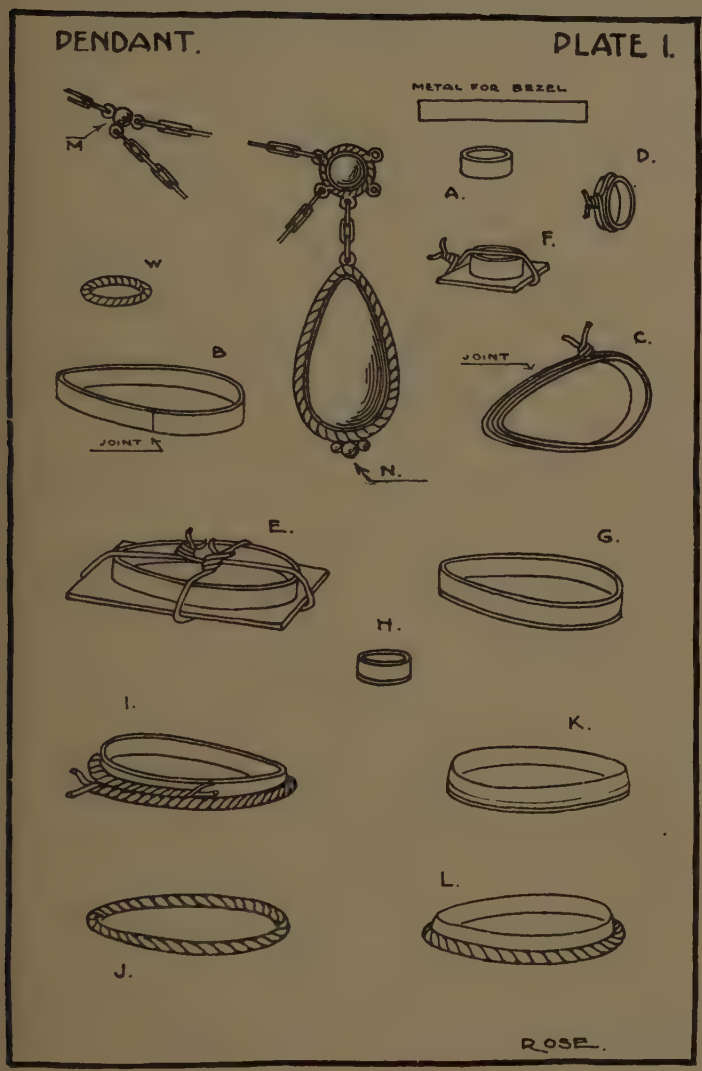
If this filing or cleaning is not done, it is impossible to solder the joint. Having the corner now brought well together, everything is ready for the soldering process, which is described on pages 277–8. Bind a piece of No. 24 iron binding wire about the box as at J, to hold it in place while soldering. The corners are next coated with borax and the solder applied from the inside of the box. Be sure about this and do not try to solder from the outside.



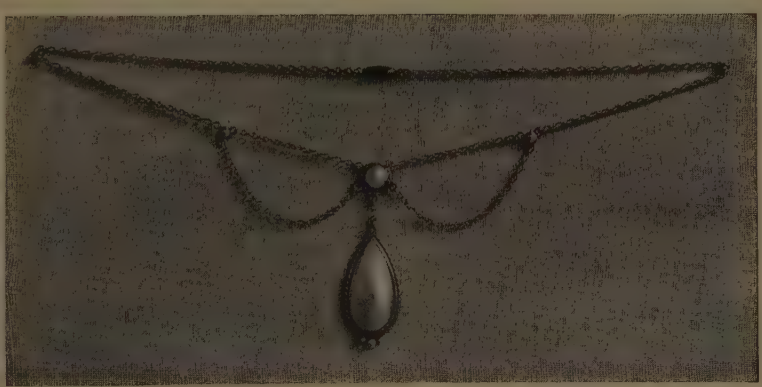
Prepare all the corners for soldering and do all the soldering at the same time; do not make a separate process for each corner. The heat should be applied very slowly at first, until the borax has crystallized and dissolved. After crystallization, the borax acts as a gum, holding the solder in place and keeping the air from the part to be soldered. After soldering, the box is pickled, washed and dried. The corners are next filed a little to remove surplus solder, and the box is again placed over the block which is held in the vise as at G, Plate 2, to square up the corners and bottom edges. Better results will be had if this block is of metal. A metal hammer is better, also, than the mallet. Too much hammering, however, will stretch the metal and make the box larger at the top than at the bottom. After shaping the corners and squaring up the sides, the top edges of the box are next filed level so that the box will be the same height at all points. In this particular case it is desirable to have the edges perfectly smooth, so a piece of emery is used after the filing. The cover is made from the same gauge of metal as the box. On account of the hinge it is necessary that the cover come on the same line as the back of the box, but the front and ends of the cover overhang a little as in Plate 1. If desired, the top of the cover may be given a hammered surface, with all edges left perfectly smooth.

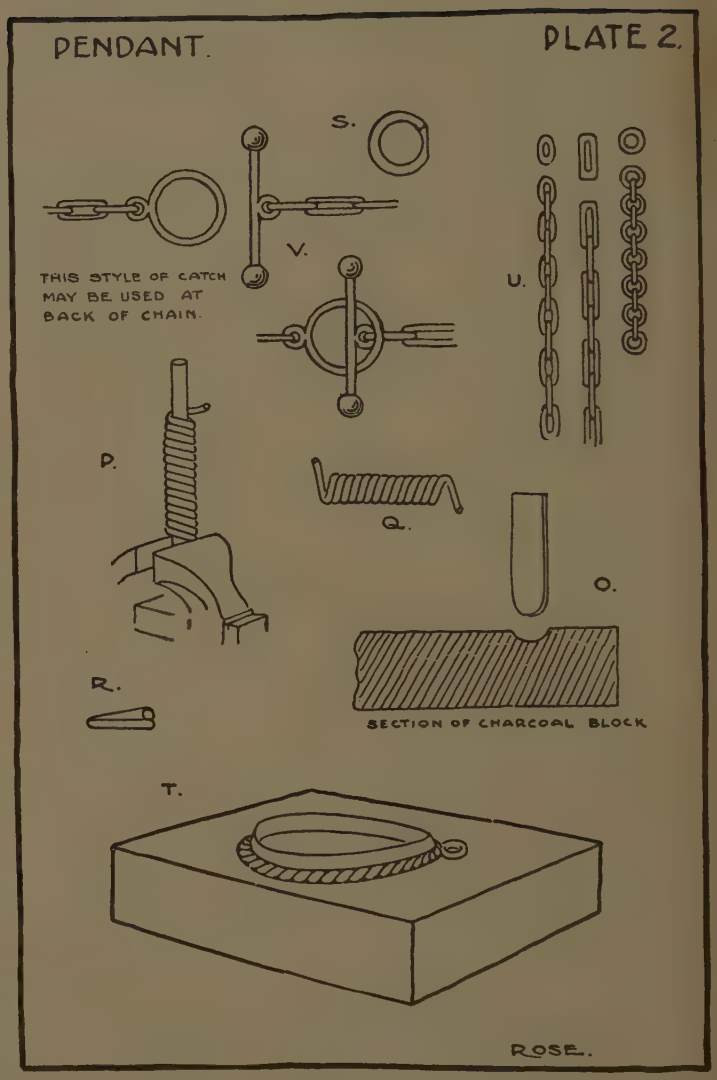
To make the hinge, make a pattern or tracing from the design K, Plate 1, and at the bend where the joint is to be, cut the ends as shown at L, Plate 2.

The pin for this hinge should be about $\frac{1}{16}$" in diameter, and a wire nail is best, being stronger than copper or brass. Therefore the projections for this hinge should be three times that diameter. The short piece of hinge is to be riveted to the back of the box through drilled holes; the long piece, to the lid. The rivet heads are to be filed as shown on Plate 1, from round-headed copper tacks. Cut these off, and in setting them, rest the filed head in a hollow made in a block, and head the other side with many gentle taps of the hammer. See Figs. N, O, P, Q.

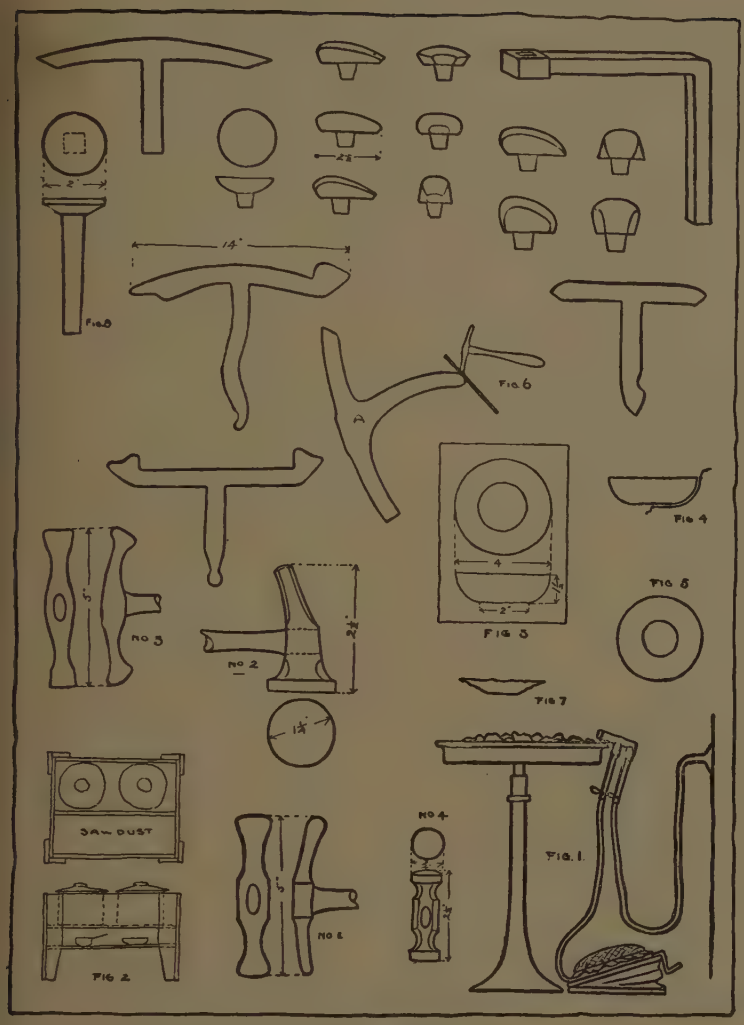


A PENDANT AND NECKLACE. The first things necessary are the semi-precious stones which form the central feature of the design. Those used in the pendant shown are of shell pearl; this is not expensive and looks well with the silver. The necklace consists of the jewel pendant, two silver balls, the chain and catch, and two shorter chains festooned from the jewel to the two silver balls. Each silver ball must have soldered to it three rings or eyes for attaching the chains, and on the setting of the upper and smaller stone five of these are necessary. On the bottom of the pendant are soldered three balls of silver as a sort of terminal accent. The bezels that inclose each stone are made from 24-gauge silver each $\frac{1}{8}''$ wide. Bend each one around its stone, mark where they meet and lap, and cut at that point. See A and B. Bind each with binding wire and solder their joints, C–D. Next file one face of each bezel smooth and level and solder to a backing, as Figs. E and F, and pickle. See page 278. G and H show these backing pieces filed very close to the bezels after having been sawed to within $\frac{1}{32}''$ of them, leaving a shoulder on which to solder the twisted fillets. For the twists, see page 290. Plan enough for both settings. Measure, cut, and solder these. Also, to insure a good joint with the bezel, lay them on the charcoal block, drop a bit of solder here and there along each, and melt and run it along the twists. After fitting the two settings, *saw* the ends off square — do not cut them —





so as to have a good joint, as this is in plain sight. You now have the two rings as at Figs. J and W. Next file down the tops of each bezel to the right height, and thin down the top edge, resulting as at Fig. K. Solder the twisted rings down on to the backings, being careful that they touch all along, as the solder does not readily follow a twisted part. Place several more small pieces on the twist, as this will help it to bind to the bezel; otherwise the solder is here liable to flow along the twists and not adhere to the proper parts. Look out that the flame does not unsolder the other soldered parts; watch it very closely. You are now to make the five balls shown at M and N, Plate 1. At O is shown a piece of copper, 18- or 20-gauge, sharpened to a semicircular rounded point. With this scrape in the charcoal block a shallow depression, and taking five little scraps of silver, melt them with the blowpipe, and they will roll down into the depression as balls. A few trials will enable you to judge of the right size. You now need 12 rings to be soldered to the two largest balls between the chains, and to the pendant. Each ball is to have three, the upper setting of the pendant five, and the top of the larger setting, or pendant proper, needs one. To make the rings, twist some 24-gauge silver wire around a wire nail of the size you wish the links to be, holding one end of the nail and one end of the wire in the vise. With the pliers do the winding carefully, until 12 or 15 turns have been made, as at P. Now remove the nail and saw along the upper edge of the resulting spring (see Fig. Q), and each link will fall apart from the coil as at R. Bend the ends together and solder to the bezels and balls. The best results will be obtained by first filing one side of each ring a little, as at S. You will find it easier to hold these rings with the pliers while filing. When the rings are all ready, first attach the one to the top of the pendant, laying this on top of the charcoal block as at T. Coat the joint with thin borax and place a small piece of solder over the joint. The upper bezel which requires five rings, and the two balls each requiring three, had better all be soldered at the same time. If you get the borax on too thickly you will find it difficult to keep the rings in place. After fixing the rings, solder on the three ornamental balls at the bottom of the pendant. When this is done, all parts are pickled.

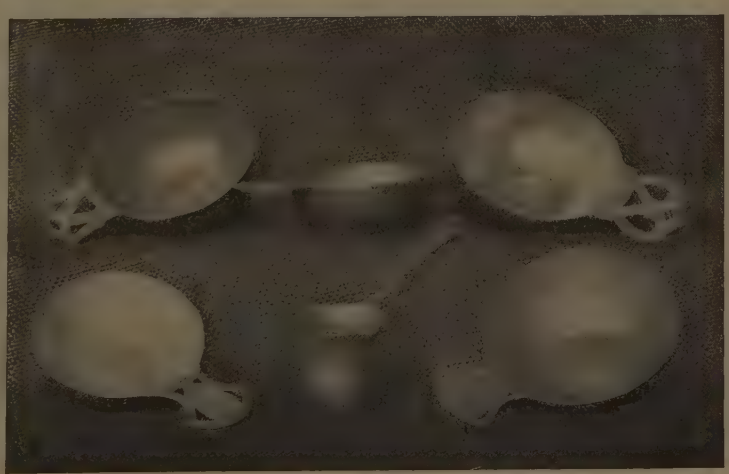


though a small one of that pattern does not come amiss now and then. But what is especially needed are anvils like those shown at the upper part of the plate of diagrams. The T-shaped ones are more particularly referred to, although the dozen odd smaller appliances, made to fit a standard socket in a bench or iron flat, are usually found very useful if one follows the craft far. With these, nearly every possible shape can be fashioned, though very rarely even the expert has to make a special tool or anvil for a given job of work. They can be bought from the trade supply houses for handicraft, or you can make your own wooden models or patterns, and have them cast at any foundry for from three to four cents a pound.

You will also need an annealing tray. Hammering metal hardens it, and it is softened by being first heated thoroughly over coals or a blown flame, and then cooled slowly. This last step is not true of copper, for it is best for this metal to plunge it directly into cold water.

At U are shown varieties of links; at V a catch such as you can make, though perhaps both chain and catch would better be purchased, for this first work.

SOME BOWLS MADE OF COPPER. For advanced working in metal, other than the tools that have been referred to, for bending and hammering the metals into shape for larger objects than jewelry, what are grouped under the general name of anvils are necessary. These are not like the blacksmith's anvil,



You can make an annealing tray out of sheet iron, about 18″ square and 3″ deep, filled with coal slag, or you can buy one like Fig. 1, on page 297, which is circular and may be rotated. The blowpipe is shown attached to a pair of bellows worked by the foot. At Fig. 2 is seen plan and side view of a stand holding two two-gallon stone jars and half a bushel of sawdust. One jar is for pickle, the other for clean water. The sawdust is for drying the plates or articles of metal after heating and pickling. Pickle is the trade name given to the solution used for cleaning metal. Its formula may here be repeated. One suitable for most purposes is made of one part nitric acid, 1 part sulphuric acid, 8 parts water. To make a simple bowl in copper let us first draw our pattern, Fig. 3, and to find out how large a circle of metal we must employ, take a string and measure the side view as at Fig. 4. As metal stretches a little in hammering, for a bowl this size we must allow about ¼″, and so if you are ready to go ahead, let us say that you will require a diameter of raw material of 5½″. Describe this circle and another for the base, of 2″. Cut with the shears and the result will be like Fig. 5. As a rule the copper comes from the rolling mill somewhat hardened, so it is safest to anneal it first. When dried on the sawdust it is ready for the shaping by means of the hammer and anvil. Select an anvil which conforms to the curve of the bowl and also to the circle of its base. It is held and hammered as at Fig. 6, A being the anvil, to be held in the vise, and the disc of copper being shown as a heavy edge-line. A No. 1 hammer is the right size and shape. Follow around the circle once with light blows at first, then gradually hammer around, turn after turn, until you have worked up to the top edge of the bowl, and the result will be as at Fig. 7. As hammering hardens the surface, anneal after every hammering of any given area. The next step is to finish the bowl by planishing the surface, and shaping it to the rounded form. A No. 2 hammer is the right one to use for this, having a broad smooth face that will take out all irregular places and leave a refined curve and finished surface. If during this operation the bottom gets a little out of shape, take a stake, Fig. 8, and by using hammer No. 3 or No. 4 it can be easily brought back. During the hammering process the top edge of the bowl will have become very irregular and must be trimmed off level. To do this place the bowl on some level surface (a surface plate will give the best results), and with the point of a surface gauge describe a line about the top making it the right height. A surface plate is a block of iron or steel with the upper side planed smooth like a table. A small pair of shears is then used to cut to the line, after which a file is used to finish the edge, leaving it perfectly smooth. When your bowl looks right to you, saw a handle for it, after the style of those shown in the smaller illustration. This must be neatly riveted on.

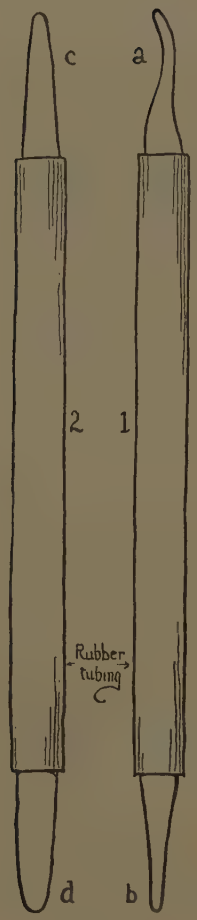
LEATHER-WORK

WE are now considering a craft which well-nigh defies any attempt to trace its history. In the book of Genesis, the ancient Hebrew story informs us that "Unto Adam also, and his wife, did the Lord God make coats of skins, and clothed them." The ancient sculptures give ample evidence that at a very early date in civilization leather was wrought into decorated clothing, and into trappings for warriors and war-steeds.

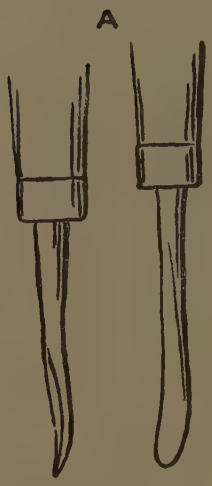
It was extensively used for sandals, for receptacles for wine and oil, for cushions, caps, mittens, boots, and many other articles in common use down through medieval times, and is in greater demand to-day than ever before. Until well into the eighteenth century, leather was produced in almost every village in Europe and America. Two different processes were commonly employed for dressing hides; the heavier skins were *tanned* by the use of oak bark, the lighter ones with alum and oil. The leather-working trades of the middle ages included glovers, saddlers, purse-makers, girdlers, bottle-makers, and shoemakers. The shoemaking crafters were subdivided into several groups, at the head of which were the cordwainers (who worked at first only in Cordovan leather), and at the tail of which were the cobblers. In 1364 a journeyman in the shoe trade received three-pence for making a pair of boots from start to finish! In 1271 in London leather goods might not be sold by artificial light, when bad leather might be passed off for good leather.

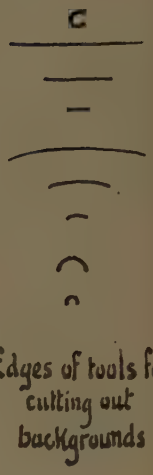
Leather outlasts many woven coverings, and when made into articles of daily use, its life is often a long one. In taking up leather work, you will find full play for your knowledge of space relations and color; and in making up leather goods, that is, in fitting, sewing, pasting or lacing them, your inventive faculties will be exercised. There is hardly any craft that enables the beginner so easily and readily to produce articles which have a real value in the open market.

DESIGNS FOR BELTS OF TOOLED LEATHER BY HIGH SCHOOL PUPILS



1 Has nut pick points.
2 Has pencil points.





Edges of tools for cutting out backgrounds

For tools you will need but two rather simple points of metal, which can be made by yourself from nut picks or wire nails. The work consists in drawing a pattern upon the surface of the leather after it has been dampened, the pattern, when dry, being permanent. Like any drawing, it involves lines and masses. Its peculiarity is that each line must be firmly pressed into the surface. One tool must be finer than the other, and this is often termed the tracer, while the rounder and blunter one is called the modeler; with it the larger surfaces are rounded up from the level. Tools 1 and 2, shown above, are varieties of these. At A are shown two views of the tracing tool; tool 1 is practically the same as A, only it has at one end a straight instead of a curved point. Tool 2 is bluntly rounded at both ends, one being larger than the other, but both straight. The best tracing point is made by filing the nut pick into two faces on its under side, — the convex side of its curve, — which makes it into a three-faced tool, with the faces tapering towards the rounded point. If the points are not absolutely smooth, they will cut or scratch the surface of the leather; they must glide smoothly over it in any direction. A good polishing surface is afforded by a woolen carpet, such as the Brussels or Wilton weave. Rubbing the point on it will not hurt the carpet and will give the tool the required burnish; the general shaping is first done with the file and emery cloths. Very good tools can be made by any boy, but shop tools are not expensive. The wetting of the leather is done differently by different teachers: some think best to soak it thoroughly and dry it for hours under cover. Others maintain that constant sponging, or wetting the design with a water-color brush and clear water, are better ways. Still others think that the thinner leather especially is best wetted from the underside only. With very thick leather, doubtless a thorough soaking is the better way. In this case it should be allowed to lie in the water until soaked, then lifted and allowed to drip for a few minutes, and wrapped in a flannel and laid on an even surface to dry. This will require for calfskins twenty-four hours, or for ooze cowhide about five or six hours. The leathers commonly used are Russian calf or split ooze cowhide. Sheepskin is too light and thin to model well. The best part of any skin for

this work is that nearest the backbone. Thinner leathers that will never model well are suitable for lining or backing for cut-out patterns. The proper condition for tooling is when the water has dried out sufficiently to offer a responsive fiber in the leather; neither too spongy and elastic nor too dry and hard. Let your first work be something small, such as a purse, cardcase, penwiper, grip tag, stamp book, stick-pin case or blotter or desk-pad. It should be simple, not only because of its size, but because small things are harder to model.

Heavy Russet Calf, English Bark Calf, and pure Oak Bark are all excellent leathers. The latter two are of very light weight.

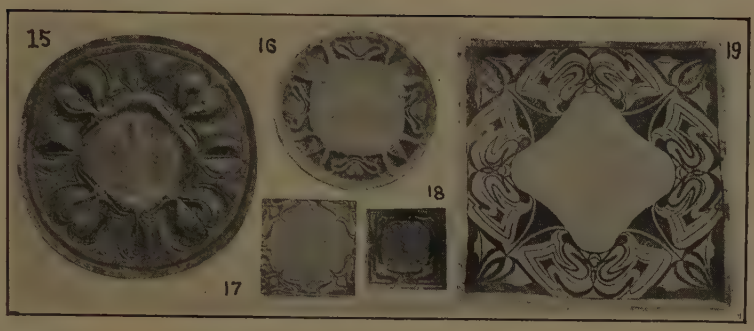
In making designs for use in leather, you should keep in mind the fact that the distinctive beauty of leather is its surface. The design should therefore be of such a character that it is composed of lines and dots, the natural marks of the tool, the beautiful texture of the leather forming the almost unbroken background; or the design should be composed of many broad-surfaced simple forms, the background or tooled portion being reduced to the least possible area. The design forms and the background spaces should never vie with one another in area. In other words, the less tooling the better!

Draw the design, and when satisfactory, transfer it to thin, tough paper

background and allowing the figure to remain in relief, though in some cases the opposite may be more effective. The initial on the bag on page 303, with its outline form, were polished down, leaving the ooze background untouched. On the two writing cases the background was polished down, or, in No. 1, it was stamped down with a carpenter's nail set; this produced

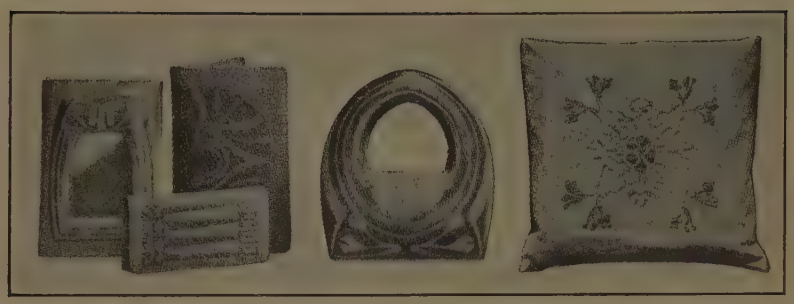
and pin this over the leather to a drawing board with thumb tacks. If you wish to preserve it, make the transfer on linen tracing cloth. Always allow a little for borders. With the finer tool follow each line of the design, impressing it firmly upon the leather beneath. This is the mode of procedure whether you wet the leather by soaking or by merely dampening it just before tracing. Some prefer a hard pencil, grade H, to the tracing tool, for this part of the work. Whatever you use, be careful not to cut or scratch through on to the leather. Remove the tracing and the design will be found nicely traced in dark lines, which will be permanent when dry. Now go over them again with the tracing tool, to deepen and improve them.

It is certain that some leathers cannot be wetted by sections, as they show distinct stains when so treated. This is especially true of the thicker leathers of light color, with fine surfaces. The two oblong designs for writing cases shown on page 304 were made by successive wettings with a brush as the modeling of the design proceeded; as were also the pocketbooks, purses, penwipers, and the bag shown at the left of page 303; also the lamp and table mats at the top of the same page. As a rule, the best results come from polishing down the a ground made up of tiny ring spots. Your first design would better hold to simple outline work, like the purse on page 303, No. 10, or the very simple modeled forms on the penwipers on this page. Try for the evenness of line that you may have seen upon book covers, or upon the straps of beautifully wrought harness. Keep the straight lines even and true in direction and uniform in depth. As leather is a flat surface, any considerable height of relief in the modeling is out of place. Such relief may properly be cut in stone or carved in wood, but we would never think of so weaving dress-goods patterns, or a coverlid or curtain. The nearest approach to relief in such fabrics is in brocades, but even there the artist remembers the limitations of his material. Leather is thin, and should never be made to try and present the effects of a thicker or a rigid surface.

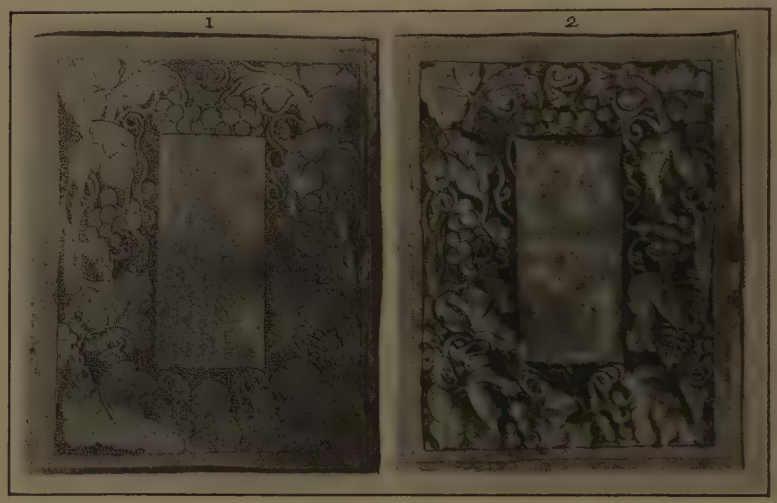


Very thin leather will work nicely if only the back is sponged, as otherwise the surface is apt to become spongy, and even obliterate some lines of the design. Thus far it is supposed you have been working well with the tracing tool. Now suppose you try the modeler: Make a design somewhat larger so as to offer a little more background space. You can make very interesting tools for background stamping out of wood, by whittling the end into the shapes of squares, triangles, crosses or circles, either hollow or full. You will find leather surfaces wonderfully responsive to careful manipulation. The outline diagram on page 300 (B) suggests how the pattern is brought up by modeling down the background between its parts. On page 301 the designs call for the use of the modeling tool. However, you may choose to shape the ends of this tool as a flatter point, like a spoon, or a large rounded one; the idea is to enable you to make big, smoothing strokes, in order to press down the surface evenly, leaving the figure raised in relief. Leather experts can model in what is, relatively, very high relief; but this is not especially desirable, and is out of the question for beginners.

In using the modeling tool, try it first on small scraps of leather and thus master the strokes by which you mean to express the modeling. Draw the tool towards you, pressing it hard into the surface at the beginning of the stroke, and gradually lightening the pressure to nothing at the end. Then reverse this process. Try again, using the tool very slantingly, so as to model as wide a surface to the stroke as you can. In a short time you will have established your own method of procedure, following out this general principle. It will also, what is fully as important to learn, show to you the limitations of tool and material. Decide upon what modeling your design needs, then produce it with as few strokes as possible. Never touch the leather with the tool unnecessarily. Try especially for good, even lines on the outline of the figure. Your modeling will usually produce the deepest background where it comes next to the figures. This will commonly result in a hard, beveled edge around the figures, which can be skillfully softened into a rounded edge by careful use of the modeler. A step farther is the modeling of the figures, as may be seen in the two middle and lower right-hand penwipers on page 301; here the petals of the flower forms are seen to be rounded or slightly embossed, all of which was done by careful modeling while the leather was suitably damp. Following on from simple outlining and modeling, there is another way of working the leather, namely, by cutting. This really gives an effect of stenciling, and is done by lightly lining in the design, then cutting out



cobbler and see how he stitches. You can also lace leather very nicely, in place of stitching, as shown in the bag, No. 5, page 303. To make the lacing, one good way, requiring only a little practice, is to cut a circle of leather, say three inches across, and pin it to a board by its center with a round awl; start a little cut in the edge, and here set your knife blade; seize the little end of leather left by the nick, and pull it against the knife. It will surprise you by spinning off a clean-cut lacing string.



the background with a mallet and chisel. For the curved parts there are shown at C, page 300, a series of chisel-ends, suggesting what are needed. The under sheet of leather is then fixed by pasting, drying the work under heavy weights. No modeling should be attempted, as such work is best done by using the light-weight oozes, such as velvet sheep or ooze calf. However, when you have chosen a design for a cut-out pattern, which demands modeling, use ooze cowhide. As an underlay for bags, cardcases, etc., mocha castor is good; but for an article like a belt a firmer leather is desirable. Sometimes the underlay is made from silk or cloth to match a gown. If you wish to line your work, spread a good paste or glue evenly but thinly upon the back of the leather design, put the lining in place, and smooth out the air-bubbles with the hand or a photographic mounting roller; if the article is a purse or other work requiring folds, crease these in the proper places, and fold, smoothing the lining away from the fold so that there will be no wrinkles. Trim the edges, using a sharp knife (and a rule) for long straight lines and a good pair of shears for curves. If the article is to be stitched, fit the parts together and paste them before sewing. An ordinary sewing machine may be used if the stitch is made long, using firmly twisted silk thread for the work. If you sew by hand, first mark out the stitch lines with a tracing wheel. Watch the harness maker or

No finer examples of leather can be found for study than some of the ancient Moorish work, finished in silver and gold leaf over tooled designs.

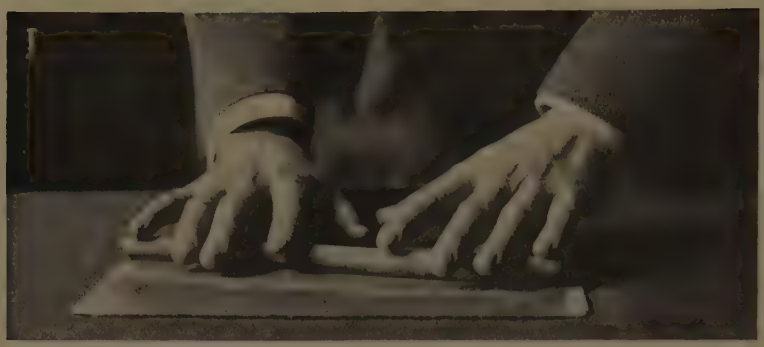
A race of horsemen from ancient days, their horse trappings offered a natural outlet for this expression of an artistic nature. To match their wonderfully wrought swords, helmets and shields, and the bits and buckles of their harness, they produced wonderful designs of saddlery. They proved that a saddle, with its girths and guard straps, its wide "skirts" and swinging flaps, together with saddle-bags and sheaths for arms carried on horseback, could be made a thing of great beauty. The excellence of Spanish leather was due to the Moors.

AN ATHENIAN LECYTHOS, 2500 YEARS OLD; AN ARABIAN TILE, 700 YEARS OLD; AND MODERN GERMAN WORK IN CERAMICS

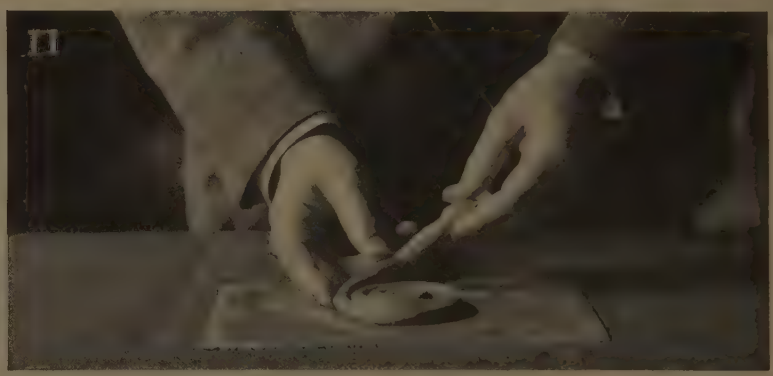
CLAY WORKING

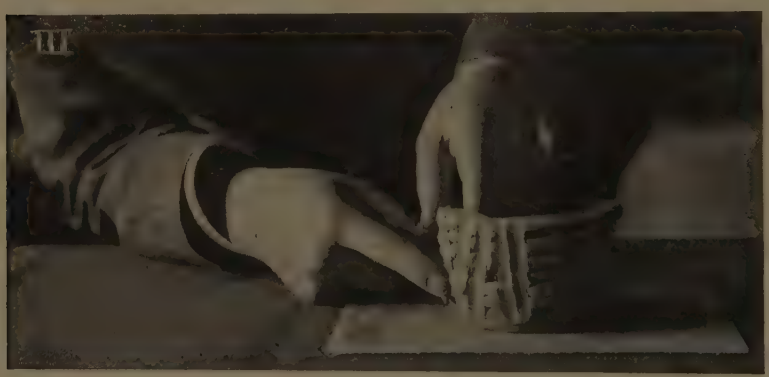
WHEN you are working in clay you are dealing with a substance, following a craft, almost as old as the human race. The man who discovered modeling must have been happy. He must have felt like a god, creating things out of dust. The pleasure of bringing matter to take on forms of life may be yours in these days without much trouble. All that is necessary is a package of plasticine, a substance recently invented to take the place of clay. Clay dries quickly and needs a good deal of attention if it is to be kept in exactly the right condition to be used. Plasticine keeps right. With this, or lacking it, with clay wet enough to model easily and dry enough not to stick to the fingers, you can easily produce animal forms, common objects, in fact almost anything (with parts not too attenuated) by simply manipulating the substance with your fingers, aided with an orangewood stick from a manicure set, or some little wooden tool similar in shape. The plate on this page shows work of this sort made by children in Salt Lake City. The objects in the upper part of the plate are modeled "in the round," as the sculptors say; those in the lower part of the plate are modeled "in relief," that is, only slightly raised from a flat background. But ambitious boys and girls, unless they are foreordained to be sculptors, soon wish to make something more directly useful. So let us look into the matter and see what we can do.

There are three principal ways of working clay into useful forms: by molding with the hands, by shaping on a revolving wheel, and by casting in plaster molds. Hand molding is the oldest, the primitive, beyond which some races have never advanced. It is the method



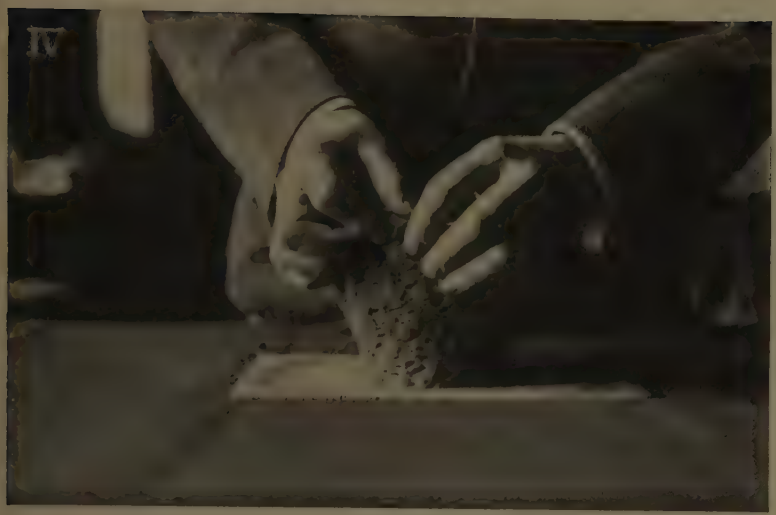
This is made by mixing clay and water to a thick cream, and straining it through wire netting. The mold is whirled on any revolving surface, and being porous, it absorbs water from the slip next to it, leaving a thin coating of less liquid clay all over the inside of the mold. After successive fillings the coating becomes thick enough for a vessel, and the surplus slip is poured out. The mold with the coating of clay is then set to dry for ten or twelve hours in a warm room. When released, the several parts of the mold come away, leaving a semi-dry clay vessel. Many copies can be made, by a careful workman, from the same mold.





best suited to little children, who often do it beautifully. But even with skilled workmen it is too slow for commercial purposes. The potter's wheel is vastly better, but requires long practice to operate it even moderately well. Its method consists in shaping with fingers and tools a lump of clay stuck fast to the center of a horizontal disk of heavy wood, which is rapidly whirled by foot-power or machinery. Casting in plaster molds is a factory practice by means of which we can make many copies of the same model. Patterns or models of clay, or plaster, or even sometimes of wood, are fashioned to suit, and plaster molds are built around them, in two or more parts which fit neatly together. In casting pottery the mold is held together by strong cord, and the hollow inside is poured full of a mixture called clay slip.

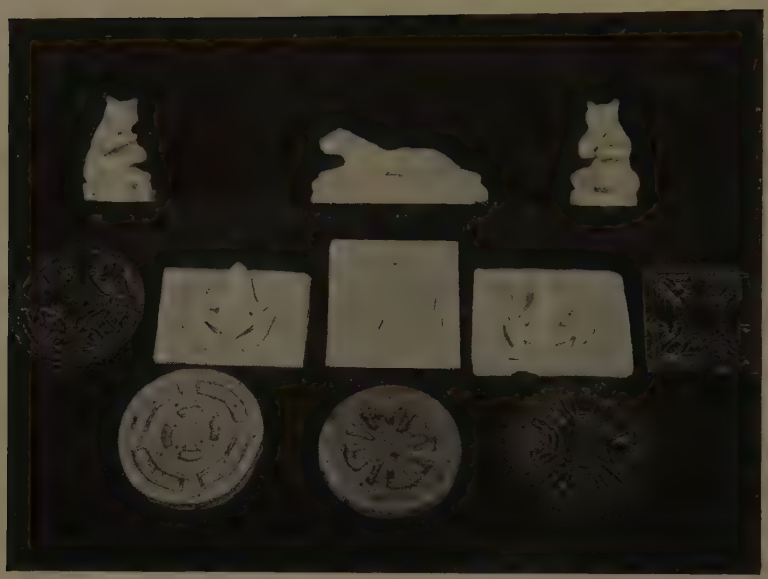
You will want to begin with hand modeling. Common sculptor's clay is a fascinating material; it is put up in "bricks," varying in weight with the moisture they may hold, but usually sold dry. Wrap snugly in a thick cloth, and soak in water for about two hours. Some clay requires more time. When you can "sqush" it easily in any direction (always testing it while still wrapped up) it is ready to model. If you feel a very hard core, however, it must soak longer. But beware that it does not get so soft as to



needed, one for guarding the shape, the other to constantly work and knead together the surface, and so build up a smooth outside and inside. If the clay becomes too dry it will crumble and "drag" under the fingers. If too moist it will be so sticky as to be out of control. After making several vessels in this way, try a small flower-pot or even a garden jar, but by using lumps instead of coils. Small squarish pieces thus kneaded together, each

melt into mud. It can be kept indefinitely by wrapping in thick cloths kept damp. An old ice-box is an ideal place for storing it. A good way to work clay into simple forms like jars is the ancient American Indian method of rolling it out into sticks or rolls with the spread fingers as in Fig. I, page 306. Make them as long as possible, and as quickly as possible, for handling dries clay so that it will not adhere well. For the bottom of your jar, coil a roll, as at Fig. II, making a round tile of the required size. Carefully work the coil together into a solid mass. (Clay cut out bodily does not work well, as it will warp, shrink, and fire unevenly in the kiln, about which you will learn farther on.) Turn the base over, smooth the opposite side, and then build up the walls of the jar as at Fig. III. Constant kneading and working of the clay is necessary to give it fiber. For the walls, a roll is laid on the edge of the base, another added to it, and so on, inclining to the inside or outside as you wish to make the vessel flare or taper. Fig. III shows how both hands are sealed to the one on each side and to the layer below, will make a strong jar. Figs. IV and V on this page show this method as applied to round vessels. Square ones can be made in the same way. Whichever way you choose, the operation should be clean cut and definite.

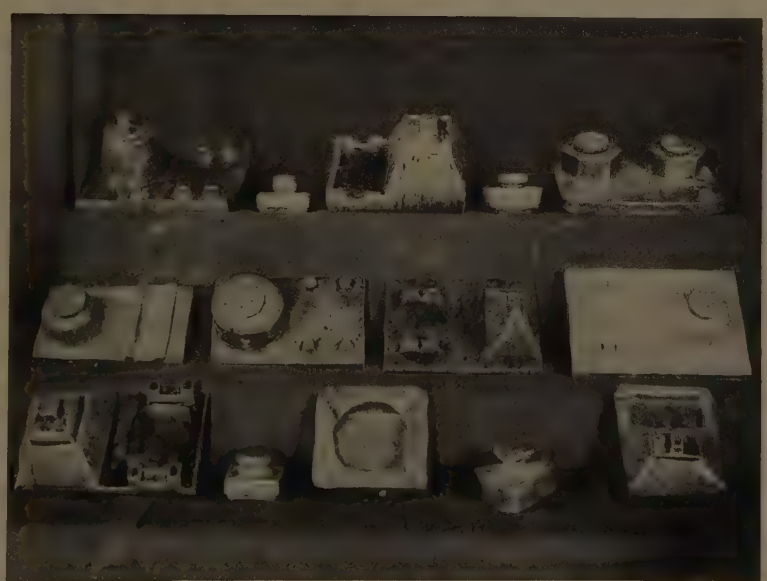
Even the best of hand work requires much re-touching, and each piece must be smoothed and scraped with a modeling tool. The surface must be made even and regular in curvature. Clay is in the best condition for finishing when it is "leather hard," that is, not dry, but



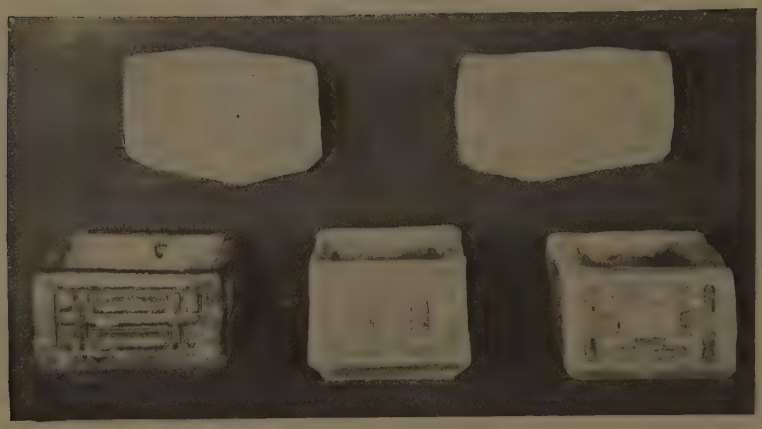
with only enough moisture to make it stiff and tough.

Tiles. Among the first pottery problems to which you may set your hand as a piece of real ceramic art, is a tile, which is the beginning of all decorative problems in this material. The tile must be built up. You cannot cut it as a slice from a large lump of clay, for reasons already given. Working with the fingers all over the tile prevents warping and distortion, and makes the density less variable. Tiles six inches square by one-half inch thick are a good size, and offer an adequate area for decoration. They should be made as square and level as possible, with a smooth surface, and good corners and edges. Instruments may be used wherever precision is necessary. Do not be content with lumpy, irregular, crooked work. Such productions are often styled "primitive" and praised as typical results of the efforts of younger children. Handiwork aims at one excellence at least, — precision of workmanship, — a long step in the direction of beauty. If a square tile is intended, it should be made as square and perfect as your ability permits. Every tile should be made for a definite purpose, — as to hold a teapot, or for a paper weight. Such a purpose is an incentive to good work. Also, each tile should have some decoration, preferably incised in the clay, this being the most direct. Such decoration is shown at the top of this page. Having built a tile, it is an easy step to add a rim to the edge and thus produce a saucer or shallow tray. A higher rim turns the saucer into a bowl or vase. The transition may thus be so gradual that you will hardly know just when you began to really make pottery; *i. e.*, real pots, modeled and hardened by firing. The two plates on this page are from photographs of articles made by children ten or eleven years old. At the top are some clever copies of well-known animal sculpture and some original tiles. Below are candlesticks, some primitive in form, but all of serviceable make and in the originals of pleasing color.

should be built upside down on a square of paper. When finished it is detached, so that the reverse side may be finished with a knob or other modeled form. Very little decoration is necessary on cylindrical pottery. The form itself offers sufficient opportunity for the expression of taste and skill in its contour. RECTANGULAR POTTERY is a third form, often akin to the cylindrical in its uses, and frequently decorated like the flat or tile form. The lower plate on this page shows a collection of ink wells, some of which are of this form. On page 310 are a few of the simpler forms of rectangular pottery in the shape of garden pots or flower boxes. Each side presents a rectangular surface for decoration, regarding which you will need some direction. This is given on page 313. Let us next consider the matter of firing; for without fire, no pot will endure.



While from flat to cylindrical ware is only a step, it requires thought and practice. Anything that is modeled in the round, like the animal forms or the frog tiles, is in a sense cylindrical, as all vertebrate bodies are based on the cylinder. Of CYLINDRICAL POTTERY, the following may be mentioned as excellent problems, in about the order in which they ought to be taken up: candle-holders, bowls (such as are shown in the top plate on this page), flower-pots, flower vases, and jars with covers for holding tea, candles, crackers, etc. This kind of pottery furnishes good technical problems, because the design involved is definite and interesting. The cover of a jar, for instance, is really a small round tile, large enough to cover the mouth of the jar. On this tile is built a second layer, just large enough to fit into the opening. This cover

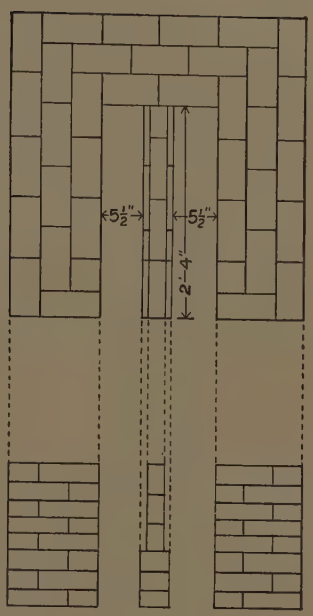


How much we owe to fire! A familiar proverb states that it is a good servant but a bad master. This is true, but no more true of fire than of any force. Wind or water is as disastrous when uncontrolled. We do not want to be mastered by any of the elements. But a mastered element is the most reliable of servants. Without fire, the mighty craft of the forge would be unknown, and the delicate art of the jeweler would be confined to the rude hammering and graving of unrefined metal. With fire to help us, from the uncertain form of clay is created and developed something that endures for all time. The oldest books of the world include libraries of clay tablets, where the word-forms and word-sounds known as "cuneiform" have been stamped deep into soft clay, baked to a permanent consistency, and have been unearthed to tell us of the life of fifty or sixty centuries ago.

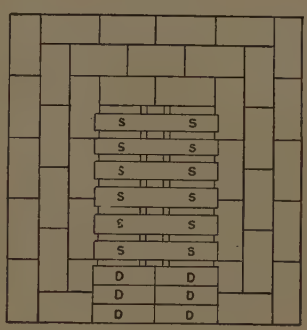
In the rooms of the Cave Dwellers in the mountains of our own Southwest have been found earthenware pots and dishes of beautiful form and color, sometimes decorated with symbolic patterns, which were doubtless made and burnt into permanency at a time fully as remote as the clay books of old Chaldea, Babylonia, or Assyria. Of the days of old King Hamurabi of the Euphrates Valley, we read that the arts and trades were carried on much as they are to-day. The potter doubtless spun his wheel around with a treadle, the baker had his ovens, and the kiln was fired for the hardening of the pots that were to contain the beans or lentils for the evening meal.

A very pretty legend of the American Indians relates that a band was encamped upon the bank of a river, when a woman was attracted by the laughter and screams of her children who had gone to play along the shore of the stream. She found the older boys floundering their way through the plastic sticky clay of the shallows, and one youngster, just liberated from the papoose-board, hopelessly stuck. She set him free, and soon after the people moved to other camping grounds. But as the season advanced, they returned, and in the heat of summer found the river much shrunken and the shores baked hard as stone by the fierce sun. And there were the tracks made by the boys' feet, each modeled true to the foot that made it! An elder of the tribe directed that clay be taken from the bed of the running stream and fashioned into various useful forms. But it was not until an unfortunate (?) squaw let a kettle fall into the campfire that they discovered one morning the secret of hardening the clay. And so the kiln came into use and, like all other means to an end, was perfected as the ages rolled on.

Many must have been the disappointments and hot the rages of those untutored children of the Beginnings, as their repeated efforts to fire their pots and dishes brought only seeming failure and disaster. But man had learned that only one trail led to success, that of perseverance; and so he kept at the fire until he found what he had sought so long and with so much trouble, how to build the clay into forms that would not burst in the fire, and how to glaze them to make them water tight. Before this discovery, perhaps the only way these people had of making vessels hold water was by weaving them of grass in a very fine mesh, which is still successfully done by some of the southwestern Indians. But this is an uncertain contrivance for boiling water, to say the least. Among the interesting stories about potters is that of the life of Bernard Palissy, born in France in 1510, whose love for natural history turned him aside from glass painting to make pottery with naturalistic ornament.

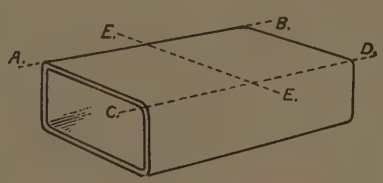


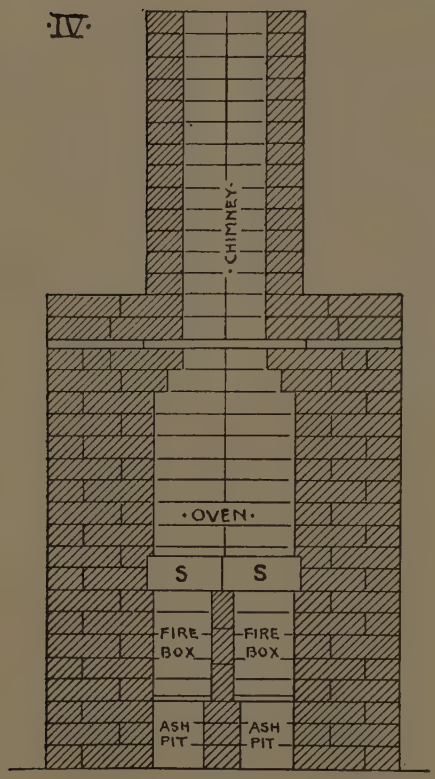
I.



II.

THE KILN. The burning in of clay wares is a sealed book to most people. Those who do know how, the skilled potters, will usually tell nothing; and in addition, they hint at enormous difficulties which the amateur could not hope to overcome. The facts are these: there is little information at hand for the novice; potter work, even in the public schools, is comparatively unknown; and regular pottery kilns and appliances are too large for the individual to afford. But one can be made that is so simple in construction that any boy of twelve years can build it, and it can be put together at a cost, at the outside, of not over ten dollars. Such a kiln is shown on this page, the actual structure at the left, and plan, section and elevation at the right and on page 312. Its essentials are a fire box, an oven, and a chimney. The oven is where you will set the modeled clay to harden by the action of the fire. The fire reaches it more directly than in a stove oven, by means of open slits in the bottom, up through which the flames often reach. It is a fierce ordeal that the pottery must undergo, but like every good thing it must be severely tested.

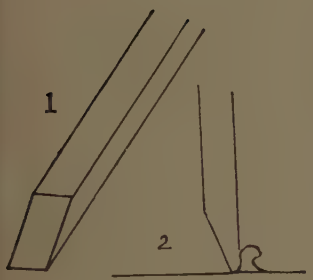


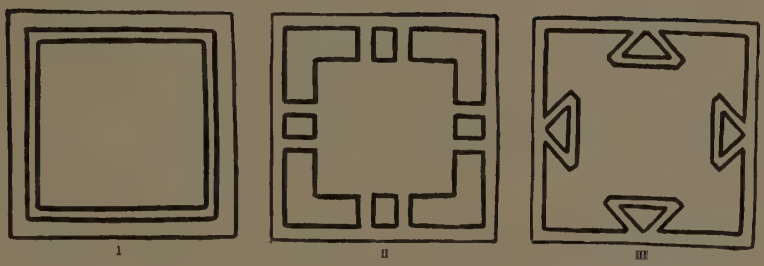


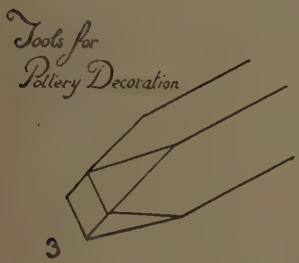
IV.

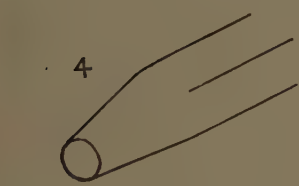
The fire is built upon a grate or rather a pair of them, for there is a middle division to the fire box; the grate is built into the side walls on one side, and rests upon a ledge allowed on the top of the third course of bricks in the partition. It is shown by double horizontal lines above the words "Ash Pit." The two bricks marked S, S, are part of the oven floor. This is built of bricks set on edge, and let into the side walls as shown, while these walls are in process of building. Refer to the plan on page 311, Fig. II, and see how this oven floor is laid on two rows of nine bricks each, the three at the front, marked D, standing close, while the others are set with some space between them. This space is in full size an inch and a half between each two bricks. Fig. I, top view, is the plan of the first eight courses or foundation, and the lower view, in Fig. I, is the front end of the same. The chimney is built as shown on this page, only it is well to gradually taper the flue as it rises. The chimney should be at least three feet high above the kiln. To cover in the chimney at the top of the kiln, get a section of chimney flue, like that shown in the lower right-hand diagram on page 311, and with hammer and cold chisel cut along the lines A–B and C–D. The side thus started will come off without trouble. Then cut it in two along the line E–F in the same way. These halves will close in the open top of the oven from back and front, leaving the chimney opening of about nine inches. Finish out this course over the rest of the top with other pieces of flue, as at the white space seen in Fig. IV, two courses down from the top of the kiln. Then finish the two top courses and build the chimney as described. The proper place to set a kiln is on ground slightly crowning, so as not to have a damp fire box, from surface drainage. Smooth out the place and dig a few inches down to receive a bed of cinders, broken brick, etc., well mixed with your mortar. This mortar should be made of common river clay or school modeling clay, which costs only $1.00 a hundred pounds. A little common sand, good and clean, mixed to about one-third of the whole, will prevent much shrinkage. Spread a layer of this mortar over the foundation and bed the bricks in it. Make all joints narrow, tapping the bricks into place with the trowel. Old grates can be got at a stove store for little money. Of course the front of the oven has to be open, but when the clay ware is set inside, it is closed temporarily with loose bricks and the joints between are rubbed full of wet sand.

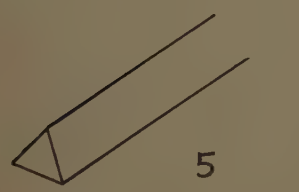
The kiln is fired with wood, beginning with a very gentle fire lasting an hour or two. This is imperative, as the flame comes in contact with the raw clay of the pottery, which, unless heated very gradually, cracks and flies apart. After thorough warming, increase the heat more rapidly to gain the full use of the fire. After the firing is well under way, — say three hours, or more, — the doors of the fire boxes should be closed with pieces of sheet iron, or bricks piled up in front; allowing air to enter only below the grates. These temporary doors are removed only to add fuel. Just the right draft is a matter of experiment. Such a kiln as the above, built by the boys and girls of a fourth grade public school, was fired successfully a number of times in from seven to nine hours. Soft coal is an admirable fuel for a kiln.











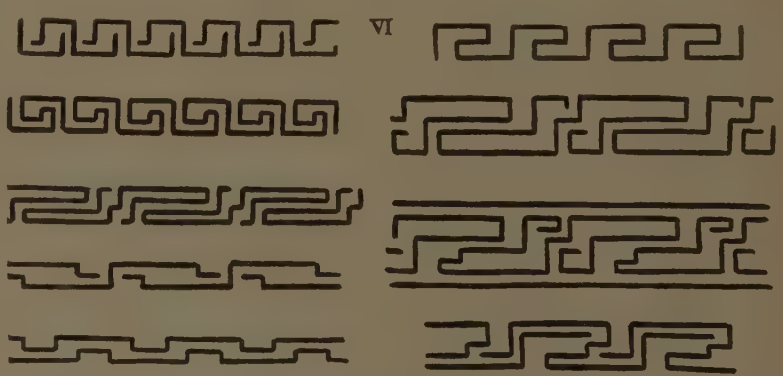
INCISED DESIGN FOR POTTERY. Knowing now something of what the pottery must undergo, you can proceed with a better understanding of the requirements. Pottery may be decorated in many ways; but of these, some demand very careful and expert firing of the kiln, and so are not practical for the beginner. Even the processes that are available must be treated with respect. Decoration should be applied to the material only in an appropriate manner. Ornament for any purpose whatsoever must keep its proper place as ornament, and be a consistent part of the whole object; and more important still, should only be used where needed. Incised design is the simplest possible form of decoration for pottery and tiles, and was the first kind ever used. It was a natural decoration, no doubt the outgrowth of the handling of the clay; it is, moreover, simple and easy to do. Try at first such a design as the straight line border at the left, at the top of the page; this is a square tile, in which due attention is given to the space relations of lines. On a tile 5½″ square such lines should be at least ⅛″ wide — bold, strong lines — serving the same purpose as the stripes on a towel, rug, or scarf; limiting the area and emphasizing it. A border is better than a central decoration, as that will be covered up by the object placed on the tile. The middle design is the same idea amplified; the idea of a square of lines, but with the corners emphasized, and the continuous lines broken. If the corner portions were made much smaller, it would tend towards the breaking up of the strength of the design, — disintegrating it. Such designs are incised with wooden tools, various shapes of which are shown at the left of the page. They may be easily made with a sharp knife, of whatever size wanted. The tool is held in a vertical position, as shown at 2, and moved so that the straight face of the tool pushes the clay out. The plainest tool is shown at 1. At 3, 4, and 5 are tool forms for stamping or impressing the clay in patterns. Fig. IV on page 314 illustrates some of the possibilities of this incised design, using short straight lines as units; first vertical lines alone, of the same lengths, then varying lengths, and finally introducing horizontal lines and dots. Change in the length and position of the lines will produce a great variety of decoration. Borders, such as in Fig. VI, will be easily handled, and are simple in construction. If these are applied to square tiles, the corners where the border turns must be worked out first and the spaces in between settled on that basis, beginning halfway between corners and working both ways. This idea is suggested in Fig. V, page 314. On page 315 are to be seen illustrations of the actual working out of decorations of this nature. See also the three designs on this page. The use to which you are to put your tile should be the first thing considered in designing its ornamentation. For instance: you would not want to leave a single narrow rim of any height around the edge of a square table tile, because a teapot would not always sit exactly even on such a support. The

IV V

must be simple; this is because the process itself does not admit of complicated composition. Incised lines are bold and strong, therefore the border as a whole should be bold and strong. However, the composition in this part of the bowl may be less simple because there are no corners to consider. In applying, carefully divide the circumference of the bowl by measurement into quarters or eighths, etc., and place your principal units accordingly. A line of simple units is of course continuous, without the accent of principal ones. Borders like Fig. VI are quite suitable for this. Sometimes simple decorations of this sort are applied in very low relief, with a brush to apply the "slip," as it is called. For this kind of pottery, this is often made of a clay of a slightly different color which will burn of a different shade than the bowl. It is mixed with water to a thick paste and often has a beautiful effect, but will sometimes surprise you by failing to stick throughout the burning. Another way is to add pulverized yellow ocher or burnt umber, about 5% to 10% color to the clay — grinding clay and color for half an hour in a mortar. Add water to make a thick cream, and apply to the bowl with a brush. Regular pottery colors, mixed with gum tragacanth, give delightful effects when fired.

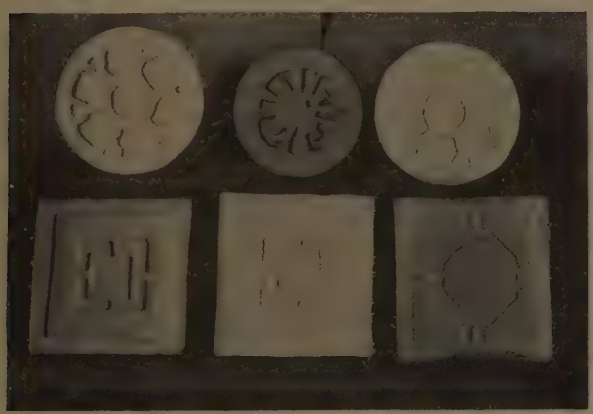
surface in general should not be so broken up that it is no longer a horizontal surface. Therefore do not make deep incisions in your decoration.

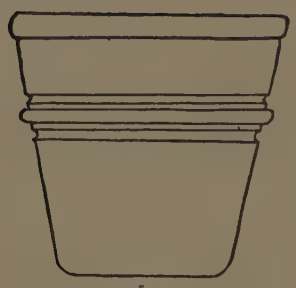
For a BOWL or JAR the incised decoration must be of proper size for the object, it must be in the proper place, and it must be simple. Any border bears a certain relation to the size of the bowl upon which it is to be put; it should appear as a border, not as a surface pattern. A bit of pottery may be of a nice tone all over, but incised lines do not distribute themselves over pottery surface with any grace, save in the hands of the artist. The border must be in its proper place; that is, it should not be put at the point of the greatest curvature of the side of the bowl, which place does not need to be emphasized — the curve being enough of itself; nor at the narrowest part. The border should be at such distance from the rim of the bowl that this space and the width of the border itself are not the same; this is an old and recognized principle of consistent variety. Remembering that decoration about the rim of a bowl serves a similar purpose to the stripes of a rug or towel, it is bound by like restrictions. The design



VI

More INCISED DECORATION. You will doubtless have learned already about glaze, the shiny surface which makes all earthenware so pleasant to use and so easy to clean. The manner of applying it will be only mentioned in this place. It is a process of dipping the ware into the liquid glaze and allowing it to harden by firing, after a period of drying on. It is sometimes applied with a brush. The oldest and a very common sort of glaze is pure silicate of soda suitably ground and mixed with water. Your pottery, however, will for some time be confined to the sort made by the wild peoples who are still in the childhood of the race, that of clay baked or fired in the kiln, and ornamented by incised lines or colored figures, as the Indians color theirs. Black oxide of copper gives black, and yellow ocher gives red of a pleasing tone. They are mixed on a glass slab with gum and are painted on and burned into the ware. Upon this page are shown many examples of incised pottery; they include tiles, both circular and square, square pots for small plants, inkstands, a candlestick, and paper weights. These embody a certain progression in ornamentation, the Simple Border, the Central Stamp, the All-over Pattern, and, on the square pots, a symmetrical pattern, a composition which balances on one axis only. The middle illustration shows most clearly the effect of good incised decoration, thoughtfully planned and carefully done. Notice, too, that the artist relied on the simpler geometric forms for his units; that the modeling is not carried to any depth to speak of, and that if there is a central part to the design it is either related or attached to the border. It is never allowed to stand alone for a teapot to teeter on, as it were. Always carefully plan out the design on paper before beginning to incise it.





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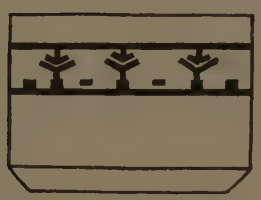
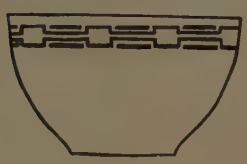


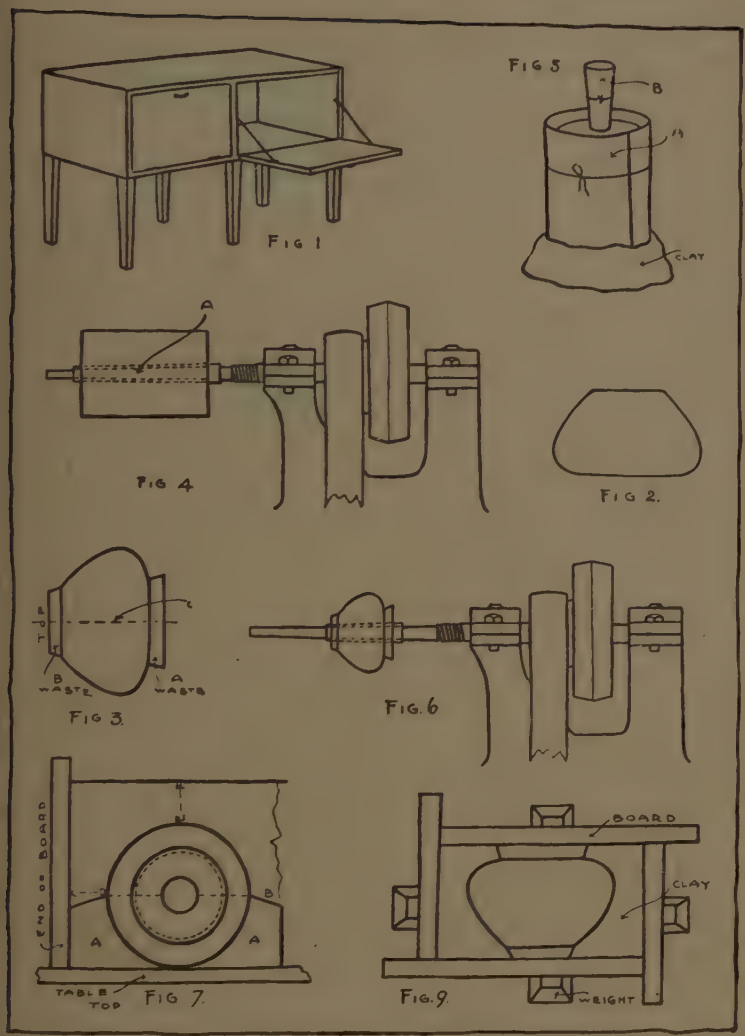
III



IV

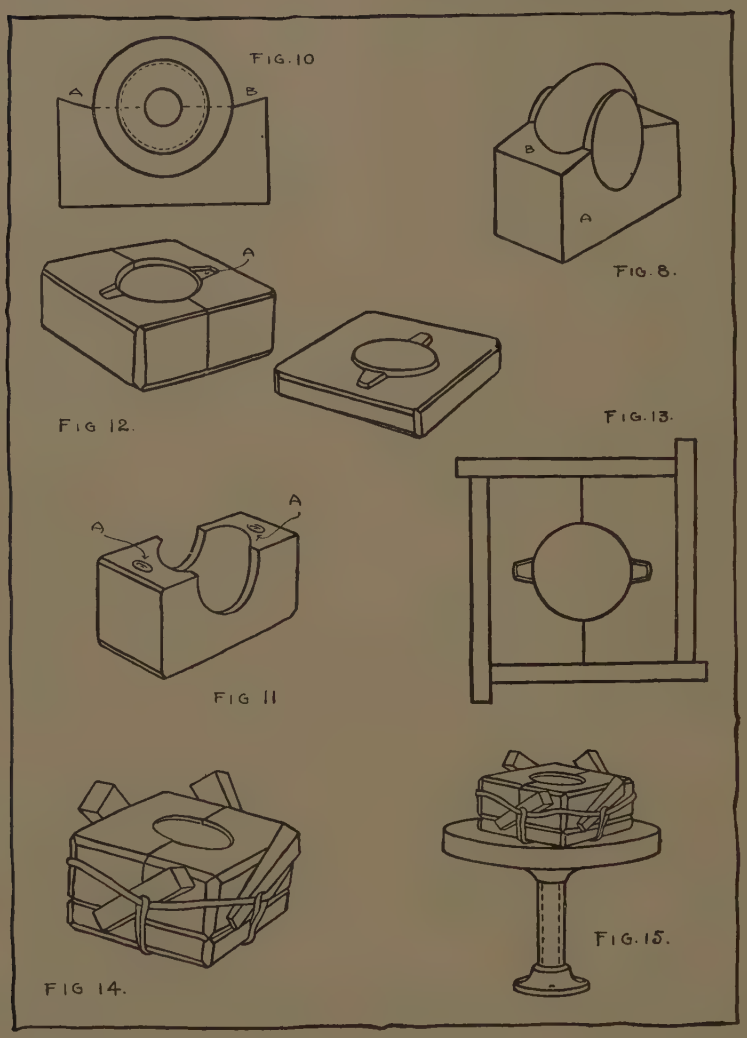
FLOWER-POTS. In designing for these necessities of refined living, particularly the round ones, the pattern should be thoroughly thought out and drawn upon paper before the modeling is commenced.

Remember that the circumference — the distance around — any circular body is about three times the distance across it, or its diameter. After laying this out on paper you can determine how many repetitions of your unit you will employ, and see that the ends are planned so that they will meet without overlapping or running short. Again, in planning ornamentation for a vessel with sloping sides, you must remember that a band designed upon paper as a horizontal border will not go horizontally around the sloping vessel. It will curve upward or downward. Cut a strip of paper or take a strip of ribbon and try this. Your design, therefore, when completed on paper, must be carefully spaced on the pottery itself and drawn for working. Pottery forms, *i.e.*, the shapes of pots, etc., are usually designed in a rectangle whose dimensions are equivalent to the greatest dimensions of the proposed vessel. The design should be a true mechanical drawing, an elevation (or side view). Within a given rectangle, try and think out and show the slant of the sides, the width of the bottom, position of bands, and width of rim. For the rim around the top of a flower-pot is not there for ornament, it is necessary for strength. As the pot flares upwards, it would easily get broken, in the uses to which a flower-pot is put, if left without reënforcement. We finish a teacup by rounding the edge because it is thus most convenient for use; but never a flower-pot. Anything added to the circumference of a cylindrical object as a complete belt, makes it stronger. The enlarged parts of a cannon are for strength, not for gracefulness. They are in reality huge belts shrunk on to the main barrel. So with the belts around flower-pots like the two upper ones on this page and those at the bottom of the page. Be careful in designing them not to make incisions so deep as to break seriously into the outline of the side curve of the pot. That line is more important than the embellishment. It is what makes the pot originally weak or strong, both in looks and in reality. The belt upon the pot shown at I, could easily be made to weaken the pot if its incised parts were to be carried deeper. Above all, take time to do your pottery work well. We admire the ceramic arts of peoples long passed away, because there is something about those arts which endures. It is not the result of work rushed to completion because someone was competing with the artist and would be sure to sell his goods at "cut prices." That evil practice, from all evidence at hand, was not to arrive for many centuries after the days of the ancient potters. Each man was allowed time in which to think out and do his work well, as the work itself attests. There can be no shade of doubt as to this. That there were shirks then as now, is probable; but the majority of work must have been well done, if for no other reason than that under unlimited monarchy the best a man had in him was usually beaten out of him if it did not come out naturally through love for the task. In conclusion, remember that incised work must stand the fire. It must not be fragile.

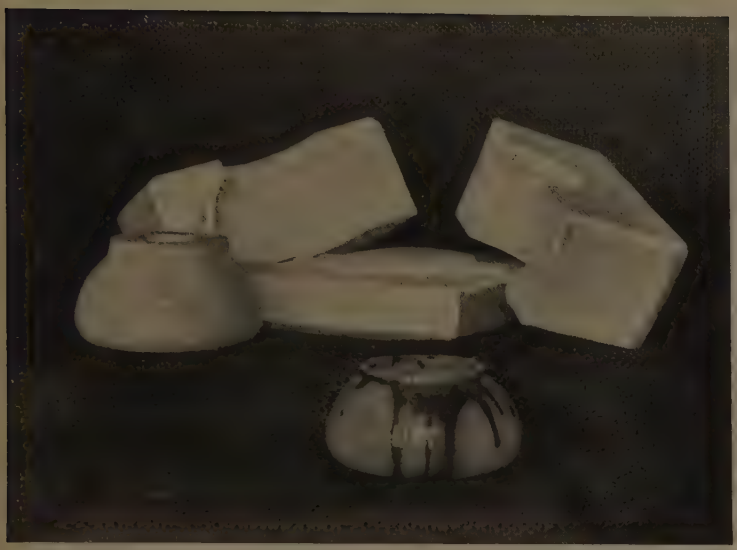


made; see Fig. 2, a very simple shape. The second is to make a working drawing, Fig. 3, in which $\frac{3}{8}$″ to the foot is allowed for contraction when using common white earthenware clay; and $\frac{3}{4}$″ to the foot when using red clay. A tube to fit the spindle of the lathe, Fig. 4, is made of heavy wrapping paper; the length of this tube is about twice the height of the object to be made. A cylinder of the same length and material as the tube is also made with its diameter 1″ greater than the working drawing, Fig. 5 A. Coat a part of the table with "parting" or size, made by boiling together for 20 minutes one pint of water, $\frac{1}{4}$ lb. soft soap, $\frac{1}{2}$ oz. refined tallow, and a piece of soda the size of a marble; and on this coated space place the cylinder, Fig. 5 A, on end. Make it water tight around the bottom with modeling clay as shown, and then place the paper tube in the center of the cylinder, Fig. 5 B. Mix plaster of Paris in a basin. To do this, fill your basin with clear water, and sift the plaster gradually in without stirring it, or else you will have air bubbles in the cast. Sift until the water has taken up the plaster to a thick cream. When ready, pour the cylinder full with one pouring. When set, remove the paper cylinder, but not the central tube, which you will use in turning the model form. Let the plaster cylinder you have just cast remain about one week in a fairly warm room. When fully dry, place it on the lathe and turn out your model, as at Figs. 4 and 6, according to whatever design you may have made. You must leave some waste at each end, as at Fig. 3. Now give the model as many coats of parting as it will absorb, to insure a very smooth surface. The waste is for convenience in making the mold.

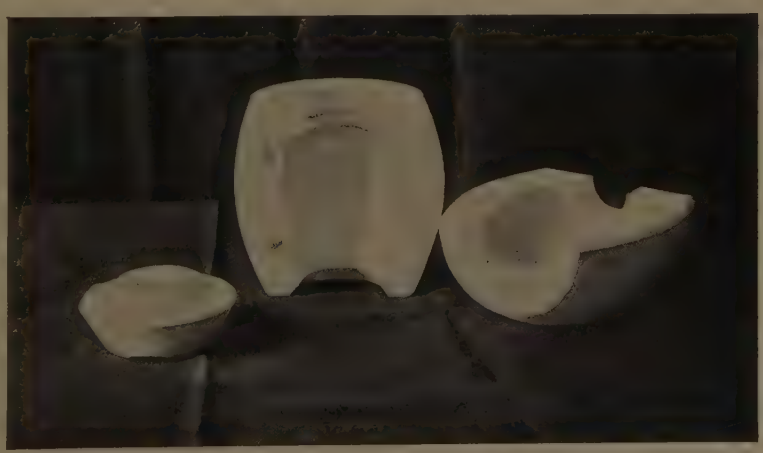
CAST POTTERY. The necessary equipment for cast pottery can be added to what you already have with little expense. In one well-lighted corner of your little workshop could be set up a foot-power lathe; a table 4 × 6 feet, with a hard top, or covered with enamel cloth (unless you can get hold of a big piece of slate for the top); a box for drying, Fig. 1, divided into two parts for convenience, and heated in some way, either by a coil from the house steam-heating plant, by a gas pipe, or by good old-fashioned kerosene. A kiln, we suppose, you have already built in the back yard. With a good supply of clay, you are ready to start work. The first step is to design the form to be

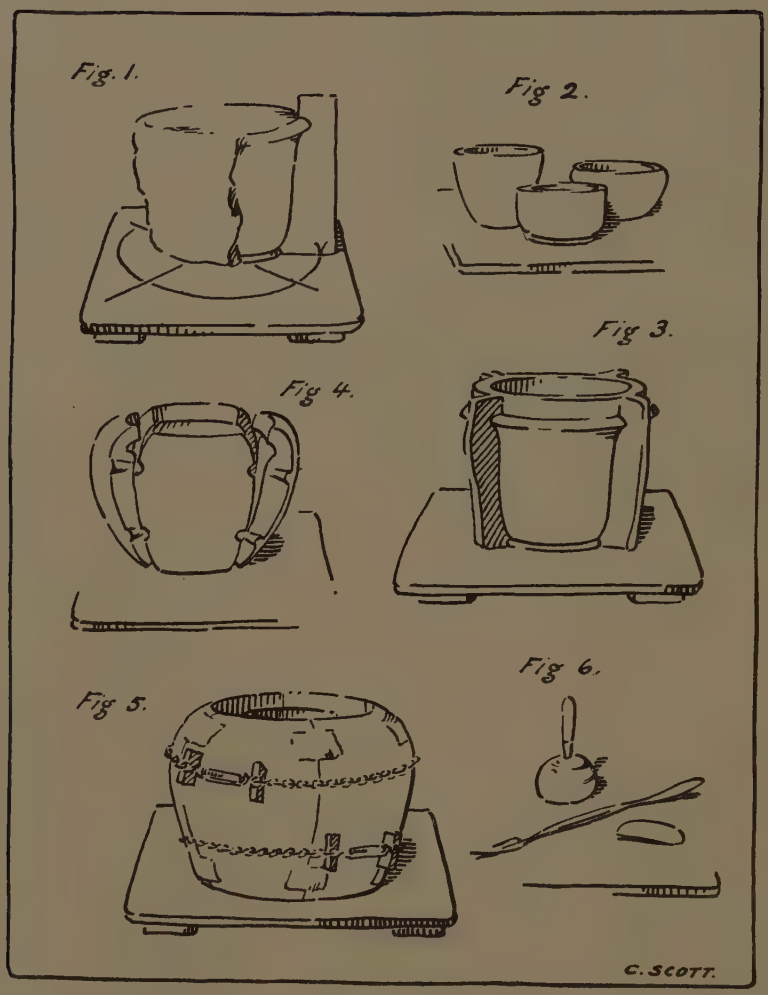


A line should now be drawn dividing the model into two parts, exercising the greatest care to get it divided evenly as in Fig. 3 C (dotted line). Next place the model horizontally on the table top, and with common modeling clay form a bed for its lower half. It is now like a vase or jar laid down on one side. Fig. 7 shows it thus in end view and Fig. 8 shows the same position in a perspective or picture view. Here the clay bed is marked A. Slope the top of the clay bed away from the plaster model as at B, C, D, in Fig. 7 and B in Fig. 8, and be sure the mold is not less than an inch thick. Now box in this clay bed and plaster model with boards. It is well to keep some handy sizes about, such as 6″ × 6″, 6″ × 8″, and 6″ × 10″, all of half-inch stock. Press these boards against the work by means of weights as shown at Fig. 9, or tie cords around the whole. Always cover your boards with parting before so placing them. Next, to make the upper half of the mold, mark off on the boards above the highest part of the plaster model, the thickness of the sides B and C–D, Fig. 7, at E–F. The clay bed is not the real and final under half of the mold, but merely a start in that direction. Now mix and pour in plaster till it is even with point F on the boards. When set, release the pressure from the outside. Remove the clay and take the model from the plaster, Fig. 10, while warm and sweating. If left to get cold, the operation is very difficult. Clean the model and remove any roughnesses, and make the surfaces on the half mold, at A and B, Fig. 10, level. Take a cent, and using it as a drill, make a hole in the center of each side, about $\frac{3}{8}$″ deep, as Fig. 11, A–A. These will serve as keys to keep the two sides of the mold from slipping. Now lather faces A–A with parting, being very careful to keep it from the inside of the mold. If any does get inside, the mold is practically useless. Replace the form in the half mold and use parting as at first. Put boards around as before in Fig. 9, mix and pour in plaster, making the second half the same thickness as the first half of the mold. Wait until the plaster is set and warm, then remove as before. Now turn off upon the lathe the waste ends. Clean the model and plug up the hole in the bottom with a little clay and apply parting. Place the model in the mold, tie sides firmly together as Fig. 12, and cut keys in the bottom as at A.



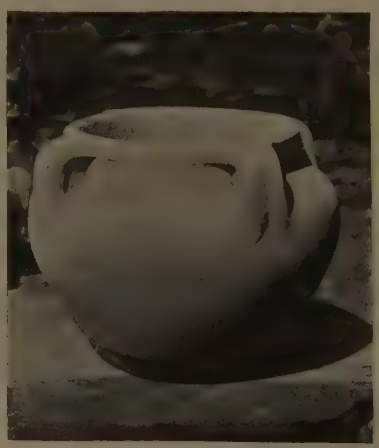
Lather again with parting. Place the mold top downward and put boards about it as before, to arrange for casting the mold for the base of the vase. Set off the depth of this base upon the boards and pour in the plaster. The resulting base-mold is shown to the right of Fig. 12. When set, remove the model from the mold, tie the mold tight together again, and set all in the drying box, Fig. 1, at a temperature of about 80°. Leave it for about 48 hours. When quite dry take the mold apart and trim all outer edges except top edges, which should never be trimmed where they come together. Put them again into the box and complete the drying. When the mold is completely dry you are ready for casting. Put the mold together, tie with cord, and wedge it as shown at Fig. 14. No cord should go over the top. Place on any revolving table top as at Fig. 15, and pour in your first thin coating of the final earthenware clay, known as slip. In pouring it, avoid bubbles and keep the table top whirling. Pour the mold full, and soon it will begin to settle, and after about ten minutes' pouring, let it finally settle until you can see about how thick it has begun to make the walls of the vase. When you have the desired thickness, pour out the surplus slip into the pitcher and let the mold drain a little by turning it upside down over the pitcher. Then set the mold in a warm place to dry and when the clay is about as hard as cheese remove the wedges and cord and also the mold. Always pull the mold away horizontally. Place the vase where the moisture will evaporate sufficiently to trim. When the trimming is completed, place the vase in the drying box. When absolutely dry, it is ready for the firing, but not before. In the illustration at the top of this page the mold is seen in its three parts, the two sides and the base, and the cast vase at the left. In front the vase is shown after decorating, glazing, and firing. The lower illustration shows a vase mold of another shape. It is always well to know the dignity of one's craft. There are significant words written in the ancient book of the Prophet Jeremiah, chapter XVII, verse 2, beginning: "Arise, and go down to the potter's house," — and in the book of 2 Chronicles, chapter IV and verse 23, are intimations of how closely associated were the gardeners and potters of kingly estates. In no craft is the creative work of your hands made more enduring than in the age-old trade of them that wrought in clay.





After the detailed description of cast pottery, only a general statement concerning the manner of working would seem to be necessary here. Fig. 1 shows the core of clay, daubed over a nucleus of bricks (the pots are large), set inside a circle drawn upon a board. At the right is a stiff pasteboard templet, cut to the curves of the pot, for scraping the moist clay to the required shape. Fig. 2 shows a few simple forms that will not burst from freezing. Fig. 4 shows the style of mold made over the core, Fig. 1. Fig. 3 shows how the parts, two at a time, were cast in plaster by means of the four clay "fences" stuck against the core, and Fig. 5, the mold assembled and held by chains and turnbuckles ready for casting in the cement. Fig. 6 shows some of the tools, such as a mason's steel spatula and a stone carver's wooden mallet. The inside of the mold is filled and worked by hand. In designing garden furniture be sure to plan only forms that will "draw" from the mold.

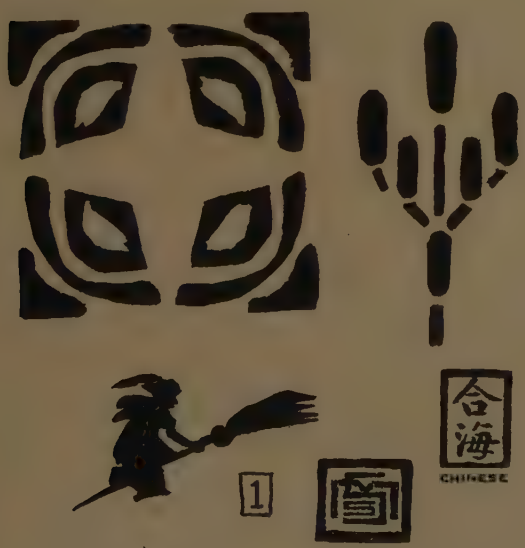
GARDEN FURNITURE. In leaving the subject of pottery, absorbing as it is, it will not be amiss to give you a hint of what can be done with much larger objects than common flower-pots, and with cement instead of clay as a material. The two beautiful garden pots shown here were the work of pupils and not of a master. They were produced at one of the schools of art in this country. Their making involved nothing but common ability, great care, and much patience.



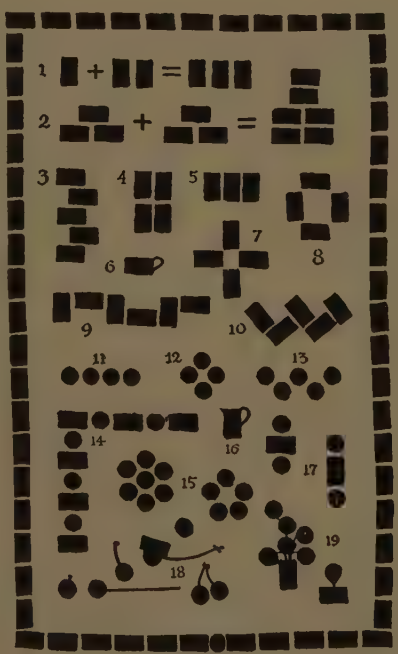
RUG DESIGN BY KATHERYN ANDRES (AGE 12). AWARDED A FIRST PRIZE BY THE AMERICAN CRAYON CO.

DECORATIVE DESIGN

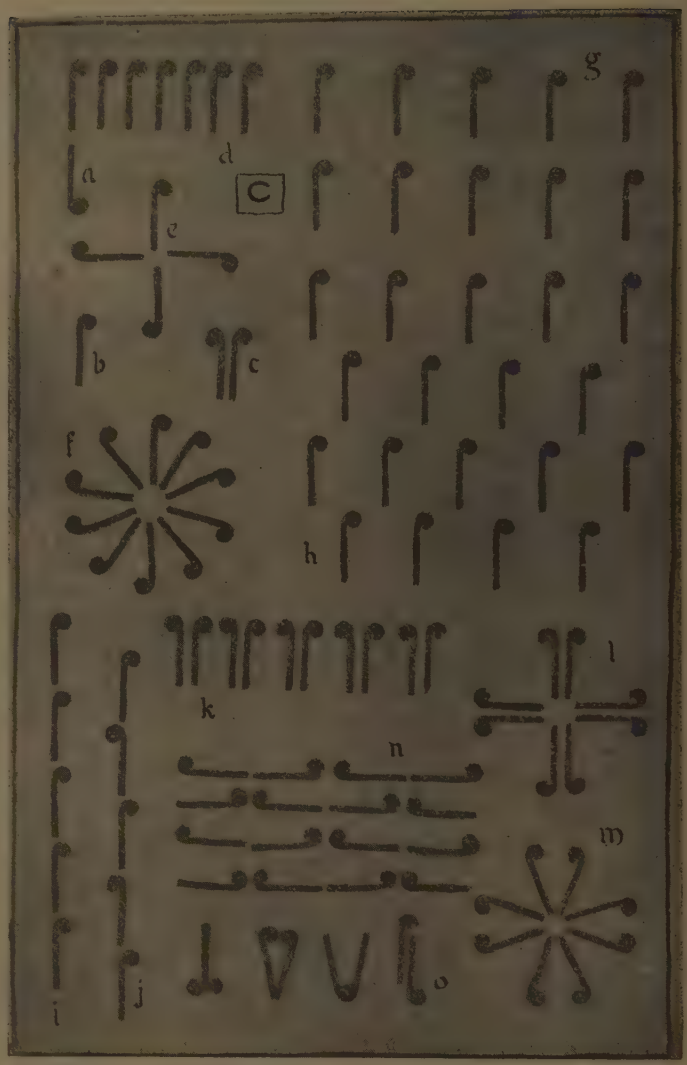
DECORATIVE design is used here as a convenient heading under which to group various phases of art-craft activity, having in common the applying of ornament to a flat surface by means of printing, drawing by hand, or stenciling. Decorative elements added in tones of color to enrich the surfaces of objects are almost as old as man himself. The face painting and tattooing of barbarous tribes is a primitive form of decorative design. Painting in slip on pottery is another phase of immemorial antiquity. The paint-decorations of Egyptian mummy cases, the crude patterns painted on hides by the Indians, as well as the exquisite prints and stencils produced by the Japanese, are examples of decorative design. The chief type of such work in modern life is the wall paper, a form of enrichment of surface said to have been brought into Europe by the Moors.



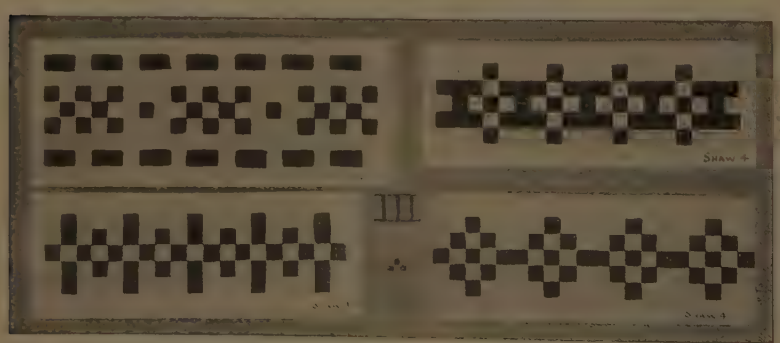
While the application of decoration in color by means of stamping, printing, stenciling, etc., may be complicated, in its earlier forms it is the simplest of processes. A series of brushmarks, a row of dots stamped with the end of a stick saturated with a colored liquid or paste, — surely nothing could be more



elemental. From the simplest of these forms, such as those shown from 1 to 19, to the complicated stamps of the Chinese, Fig. 1, from mere geometric dots, through floral elements, to the human figure, the steps are gradual and easy.



ABSTRACT ELEMENTS. It is desirable that you first get well acquainted with the material of your art, whatever this may be. The large plate on this page shows how to begin with one element and, by arranging it in numerous combinations, to produce borders, centers, corners, ornaments, etc. A very convenient way to do this is to print the units by means of a wooden stamp. Clear-grained pine wood is good enough, but you must whittle it very carefully with a very sharp knife. It is of no use to try it with a dull one. The plate on the previous page gives the simplest possible forms to begin with. By this means discover for yourself the limitless possibilities in repetition and alternation in borders, surface patterns, and rosettes, using these simple units and bi-symmetrical or balanced units, made by combining them. These designs were stamped with common writing ink on the top sheet of a pack of ordinary drawing paper of five or six sheets. It will be well for you to make a set of small sheets, each containing an example of arrangement, rather than one sheet of all kinds, as in the upper plate shown on this page. The stamp for printing this plate was cut upon the end of a pine stick $2\frac{1}{2}''$ long, $\frac{5}{8}''$ wide and $\frac{1}{4}''$ thick. A reversed form of it was also cut, on another stick, as shown at *c*. The several arrangements exhibit the repetition of this unit, and alternation of position, in borders, *d*, *i*, *j*, *k*, and in the upper line at *n;* in surfaces at *g*, *h*, and *n;* and in rosettes at *a*, *f*, *l*, *m*. A few of the many possible combinations of this simple element are shown at *o*. The lower plate shows suggestions for developing the simple elements shown on page 321 into similar designs.



a successful design is more than a row of units. The spaces between the units, the relations that are established between the different parts of the design, are so important that sometimes spacing alone makes or breaks the design. The good design strikes the eye first as a consistent whole. One is never tempted to count the units. The units seem happy together, never unpleasantly crowded, never lonely by being too far apart. When units are properly related they present an arrangement which carries the eye smoothly from one to another; they have something in common, something that links them into harmony. When units are alternated, they must present the largest possible contrast in character, *consistent with harmony*. The alternation must not destroy the unity of the effect. The five-spot of dominoes, for example, used as a unit first on-the-diameter and then on-the-diagonal to form a border would not be pleasing. The units present too little contrast in character. The five-spot and a unit composed of five straight vertical lines would be better. The upper plate on

The plates on this page show eighty or more simple units, ranging from the circular dot to a rather complicated leaf form, all adaptable to stick printing. Some of these were designed by a ten-year-old boy, others by a supervisor of drawing; the rest by a professional designer for type. Some are so simple anybody could cut a stamp for them; others would require a good deal of skill. But from any of them you can learn by experiment the important fact that this page shows also how amusing grotesques may be produced by combining abstract elements to form pictorial or decorative designs.

groups. Of course the simplest arrangement is the first, units in rows. This is common in the form of borders upon such articles as handkerchiefs, dress goods, tableware, rugs, curtains, etc. While the very nature of the material often places a limit upon the form of its ornamentation, if that ornamentation is in any sense structural, printed ornament allows of greater freedom. For instance, in Mexican drawn work or hemstitched pattern, curved lines would be impossible; the squareness of the weave of the fabric forbids them. On the other hand, a wall paper offers a surface upon which either curved or straight lines may be printed. The best designs, however, even in wall paper, are comparatively simple. Scrawling patterns with wild scrolls soon become a weariness to the eye and an offense to the nerves.

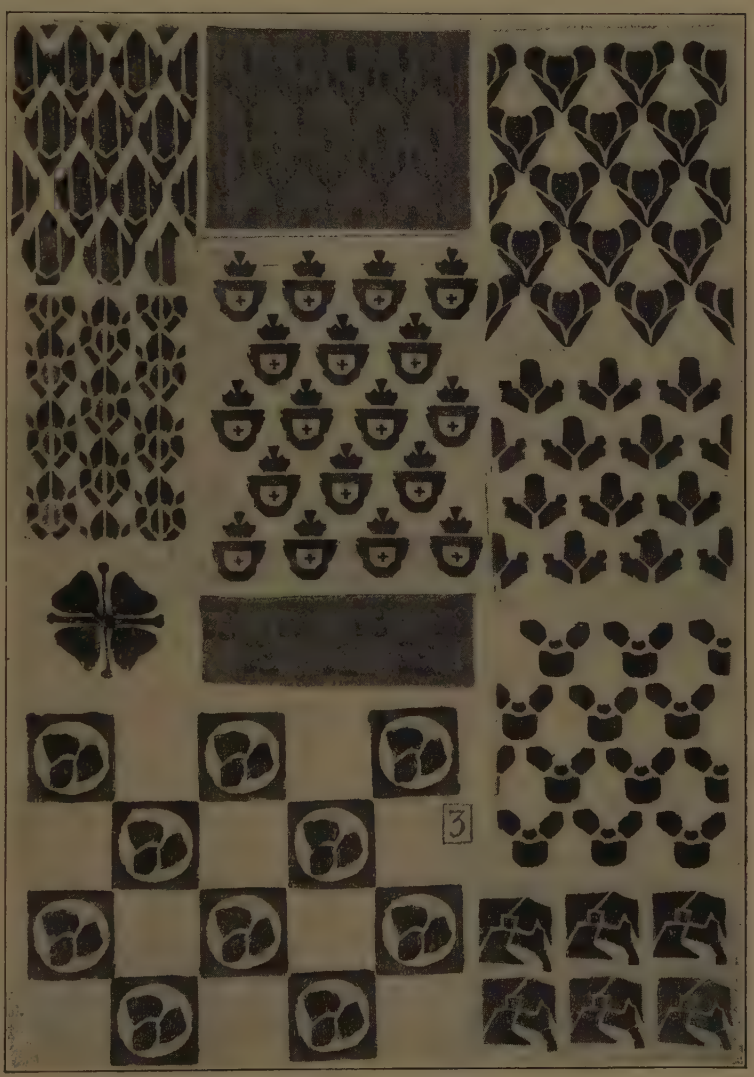
A wall-paper design, simple or complicated, in a few or many colors, should hold the eye as a whole, undisturbed by the units that compose it. The upper plate shows a few simple

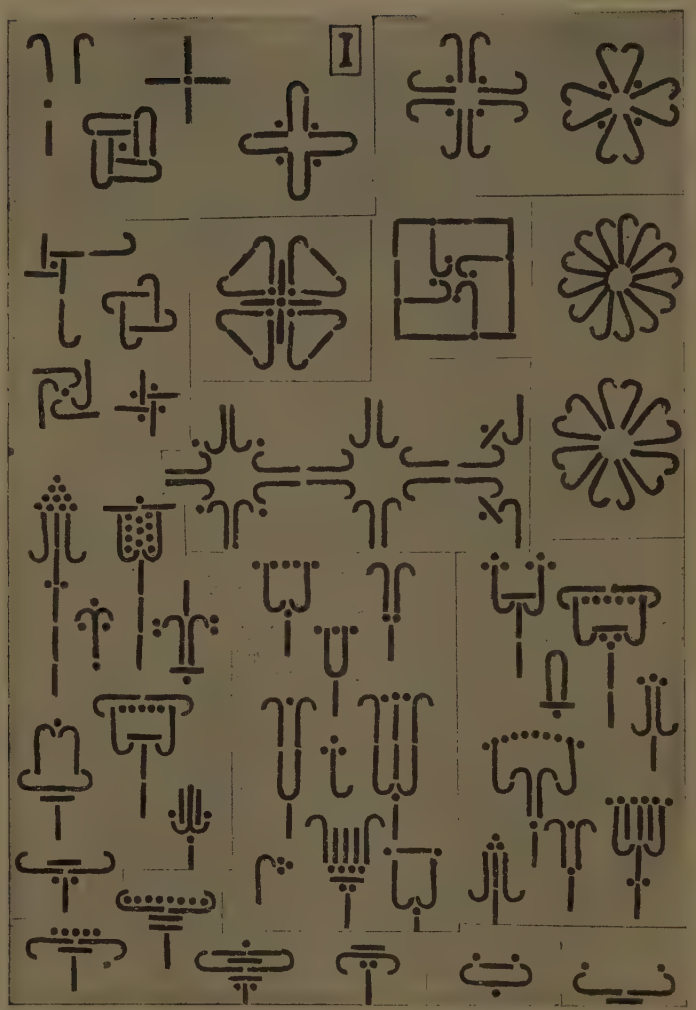
Repeating patterns. We may safely classify the arrangements of units under three types: (a) The border, (b) the rosette, and (c) the surface pattern. That is, the lines or spots of the design are arranged either side by side, in lines horizontal, vertical, or oblique; or else they start from a given point, a center, and spring out from that center in radiating lines; or the surface is evenly covered by units in orderly

felt or blotting-paper units cut to the drawn shape before the shellac dries. Then fill the felt with water color and proceed to print the pattern.

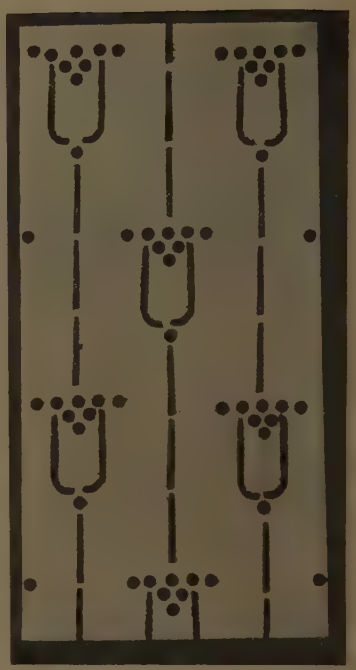
"*The I, J, and Dot.*" That is all there is to it! They appear at the upper left hand, on page 326. And yet from these simple elements almost fifty different units are com-

arrangements of the violet leaf, a straight line, and a dot. How many interesting designs are possible from these three simple elements! The lower plate shows a design which might be adapted to a wall paper, made up of elements like a dandelion bloom, if the contrast of value in unit and ground were not so great. Such patterns are often used as "end papers" in gift books. All such patterns may be made by stamping from engraved blocks. A few of these are shown at the top of this page, including a common spool, which gives a white circle on a black one. The lower plate shows many pleasing combinations of simple forms printed from such blocks. Some of them would need but little if any change to be of commercial value. You can easily design an element, cut it upon a block, and with it produce a pattern for window hangings, wash silk, dress goods, or wall paper. Printing from such blocks is great fun. An easy way to make a block is carefully to copy your design on the wood, shellac it, and glue on



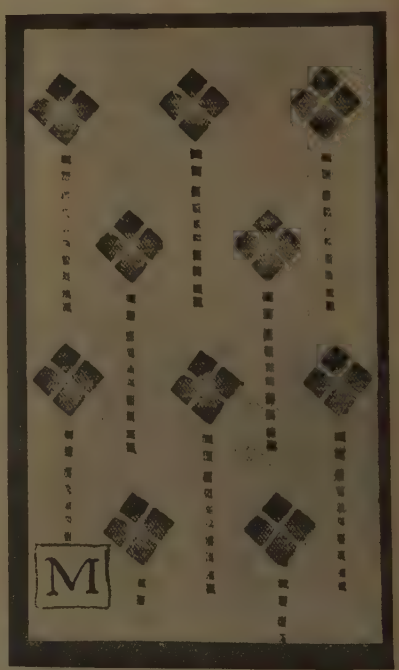


posed. These examples will help you to understand the method of producing orderly units. An evident plan or order is essential in units of every kind, for without it the mind becomes confused. These units must be combined in such a way that the eye goes with pleasure from one to the other in a sort of dance, a heavy or accented step (a larger or stronger dot or area) recurring regularly among lighter steps. In a surface pattern the order proceeds vertically, or horizontally, or sometimes, under a skilled designer, obliquely. The upper right-hand plate shows an admirable use of the "I, J, and Dot" elements in a tulip-shaped unit. The lower right-hand plate is composed of a form based upon the



leaf of the ground cornel or bunchberry.

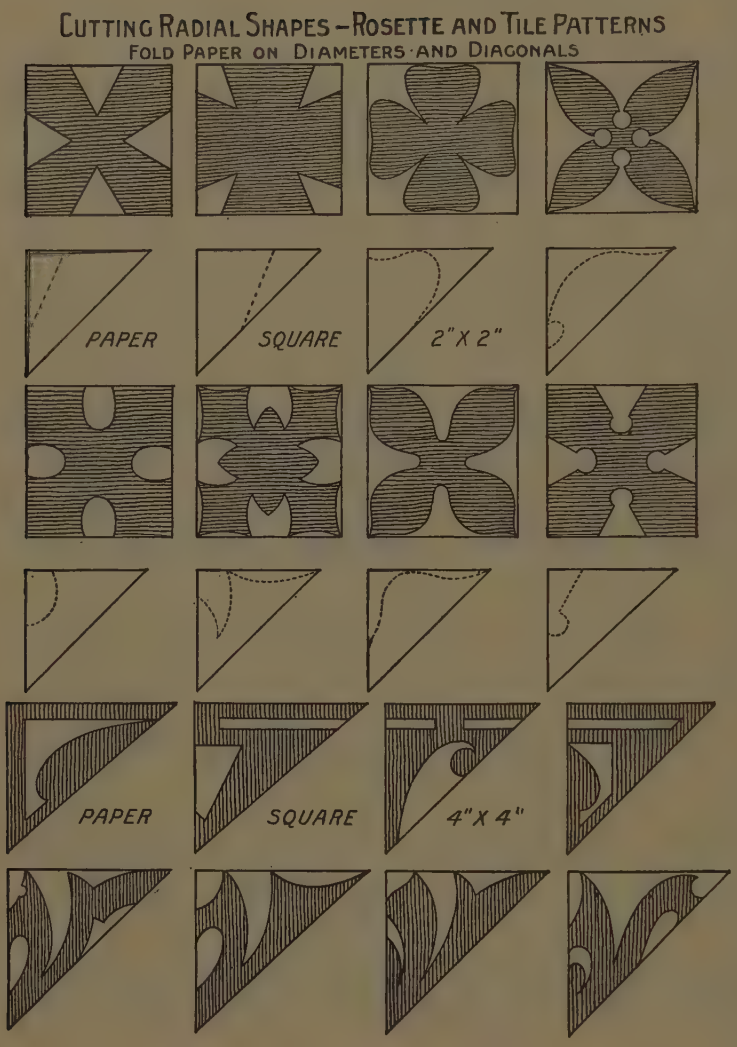
TABLE COVERS. The designs on page 327, for articles of house-hold use, are all such as might have been made by stamping or printing from engraved blocks. Figs. 1, 2, 3, and 4 show table-cloths or runners.



Figs. 5 and 6 are designs for sofa-pillow covers. Some of the designs have been worked out with thread, embroidered to give a richer effect in color. Compare Figs. 4 and 1. All these designs exemplify certain important principles: (1) Orderliness in relations of line, or Rhyme. The principal lines of the pattern are parallel with, rhyme with, the edges

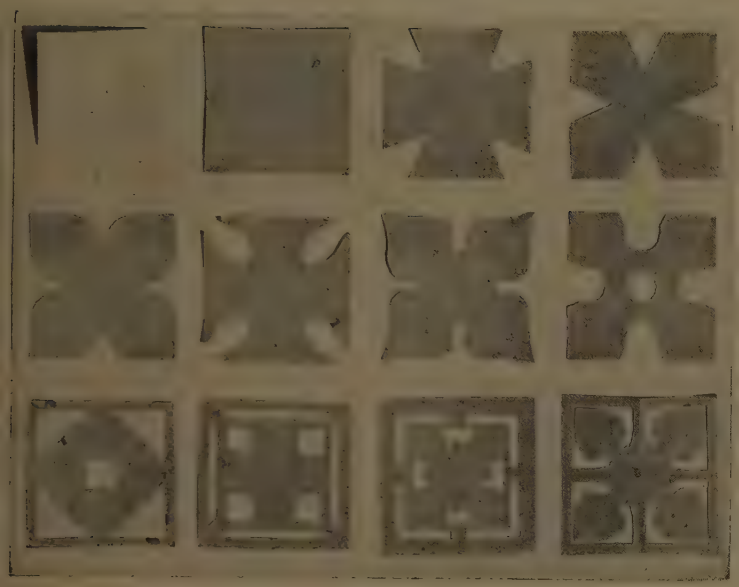
of the object. Thus they emphasize or reënforce the structural lines of the object. Nearly all other lines in the patterns rhyme with the diagonals of the square or rectangle which defines the form of the object. Such rhyming of the lines of the principal parts insures an evident and pleasing order and gives a sense of harmony, repose, peace. (2) Orderliness in relation of spot, or Rhythm. Rhythm is repetition with accent. In 1 and 4 the accent is that of march time, the tall unit alternates with the short one. The same fundamental order underlies the other patterns. In 5 the broad gray masses of the sides alternate with the small dark masses of the corners. In 6 the corners have the chief accent, and the sides the secondary accent. Fig. 2 has the heavy-light impulse in the exact sequence of 4–4 time in music; the primary accent first (at the corner), the secondary accent third (at the middle of the side), with the second and fourth unaccented beats of the measure where they belong. All the "times" found in music reappear in decorative design, and several other "times" besides. In decoration, as in music, rhythm is fundamental. It is more important than melody.

ROSETTES. A rosette is a design complete in itself, whose parts are vitally related to a center. They are controlled not so much by the law of rhyme as by the law of radiation. However simple the parts may be, or however complex, they must combine to produce a pleasing whole. The individuality of the parts must be lost, so to speak, in the new and larger individuality which they constitute. A good way to learn by experiment about rosettes and their possibilities is to cut paper. The plate on page 328 shows you how to proceed. Take a square of



thin paper, 2, 3, or 4 inches on a side, fold it on its diameter and then on its diagonals, so that you have it in the form of a right-angled triangle, as shown in the outline drawings in the plate. Now holding the folded square securely, with a pair of scissors cut as indicated by the dotted lines. Upon unfolding the paper the rosette appears. The lines of cutting, when varied even a little, will often produce a surprisingly different effect. In the best rosettes the law of rhythm is exemplified. A broad mass alternates with a narrow one; a solid mass with an opening. While the dominant law is the law of radiation, the law of rhyme may control the secondary lines, as exemplified in the rosettes shown folded in the row next to the last, where the square of the paper is repeated in the square formed by the cuts parallel to its sides. These paper units illustrate also the law of bi-symmetrical arrangement of parts. Take any one of the triangular forms shown in the lower row, and open it on its last fold only. The unit then appears of "diamond" shape (a square turned so that one of its diagonals is vertical). The unit thus made evident constitutes one fourth of the rosette. The fold corresponds with its vertical axis, and all its parts appear exactly opposite, the same shape but reversed, with reference to this axis, like the wings of a butterfly.

This bi-symmetrical unit of itself should present pleasing proportions and fine relations of line. Such units are often used side by side, the axes vertical, to form surface patterns. They are sometimes used alone, greatly elaborated, as for example in the foliated fleur-de-lis which constitutes the symbol of the old city of Florence, Italy. But important as it may be to have any unit pleasing in itself, it is far more important to have it pleasing in relation to itself repeated in the form of other units, whether arranged radially, as in a rosette, or serially, as in a surface pattern. Such pleasing relations are best secured by experiment. Take the upper right cross form in Plate E, on page 329, for example. Fold paper squares and cut the notch shallower in some and deeper in others; vary the angles of the cuts also. Unfold the squares and place the cross forms side by side. Select the most pleasing. Study it. Ask yourself why it is more pleasing than another. See if at last you



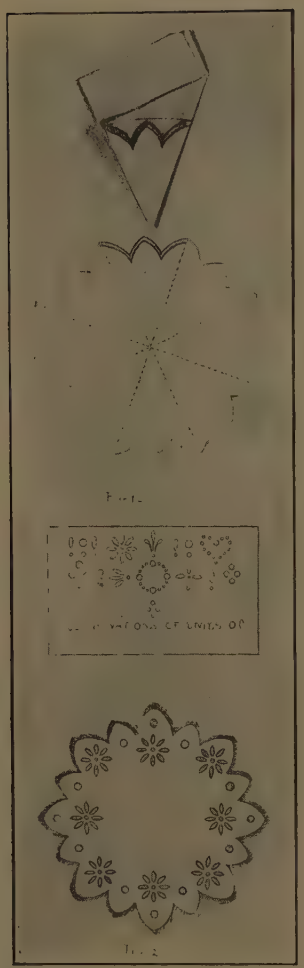
do not conclude that the notches are as deep as they can be without destroying the unity of the whole; that they are as broad as they can be without destroying the effect of radiation of the parts; and that the alternating masses of arm and void are as different in area as they can be without destroying a pleasing sequence of accent. Too violent accent is unpleasant and tiresome. March time would appear absurd if exemplified by the boom of a cannon alternated with the snap of a "paper cap."

A better exercise than paper cutting for training the eye to sensitiveness in judging fine relations of space and line, has never been discovered. Take any one of the rosettes given on this page and cut several variations of it. Compare the resultant forms. Cut a half-dozen duplicates of each variation and try these in combination, forming borders and surface patterns. By varying the distances between the units, new and beautiful units may be discovered in the background, the spaces left uncovered by the units. These are often quite as important in the design as the units themselves. In fact they may be made so important as to constitute the obvious pattern! Try the effect of cutting the units of light paper and arranging them on a dark ground, and of cutting them of dark paper and arranging them on a light ground.

The rosette as a design is applicable to page ornaments, to tiles, to sofa pillows, doilies, tablecloths, etc., and in the hands of a master to grills, floors, ceilings, ornamental windows, etc. The great rose windows of Gothic architecture are glorified rosettes.

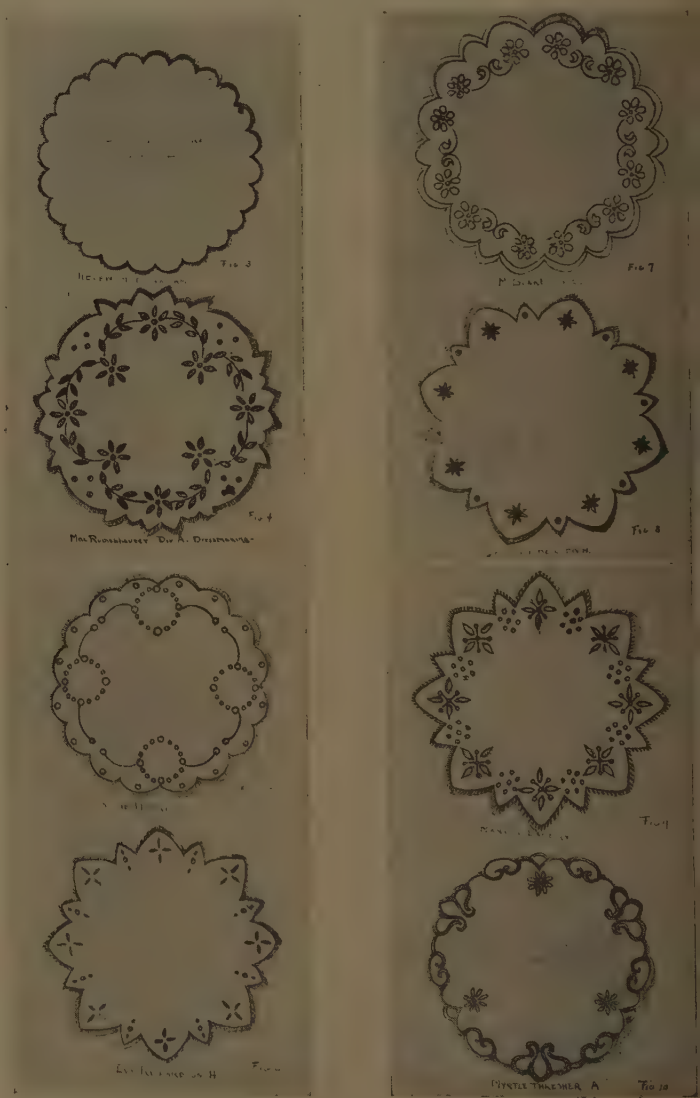
A TABLE MAT. The step from design within a square to design within a circle is easy. A doily of paper or cloth is a good subject. Fold a piece of thin paper as shown at the top of page 330. Experiment with cutting along the dotted line until you are sure of how to get a circle when the paper is unfolded. Now experiment with the ornamental contour. Look through the designs in the lower plates. Are regular or irregular scallops and notches the more pleasing? Cut your thin paper doily of the size and outline. Now decide what you will use as elements of design. All the ornament here was elaborated from a simple circle and lens-shape as shown in Fig. 1. Units are built up from these, and applied to the doily with reference to its contours. The ornament must seem to have been influenced by the shape of the doily. On the paper doilies the ornament may be drawn and painted. On doilies of cloth it may be stamped or embroidered.

On page 331 are some designs for doilies by fifteen-year-old girls. They used rice paper, and added the ornament with a brush and Chinese white. The designs were afterward worked out in linen; edge and pattern done in solid embroidery. These doilies illustrate a principle in applied design; namely, that ornament should be distributed with reference to use as well as structure. A doily in use has its center occupied with a finger bowl or vase. Ornament added to the center would therefore be obscured in use, and the production of it would be a misuse of time. The only excuse for ornamenting a thing is to give pleasure to the eye. Ornament should be placed where it can

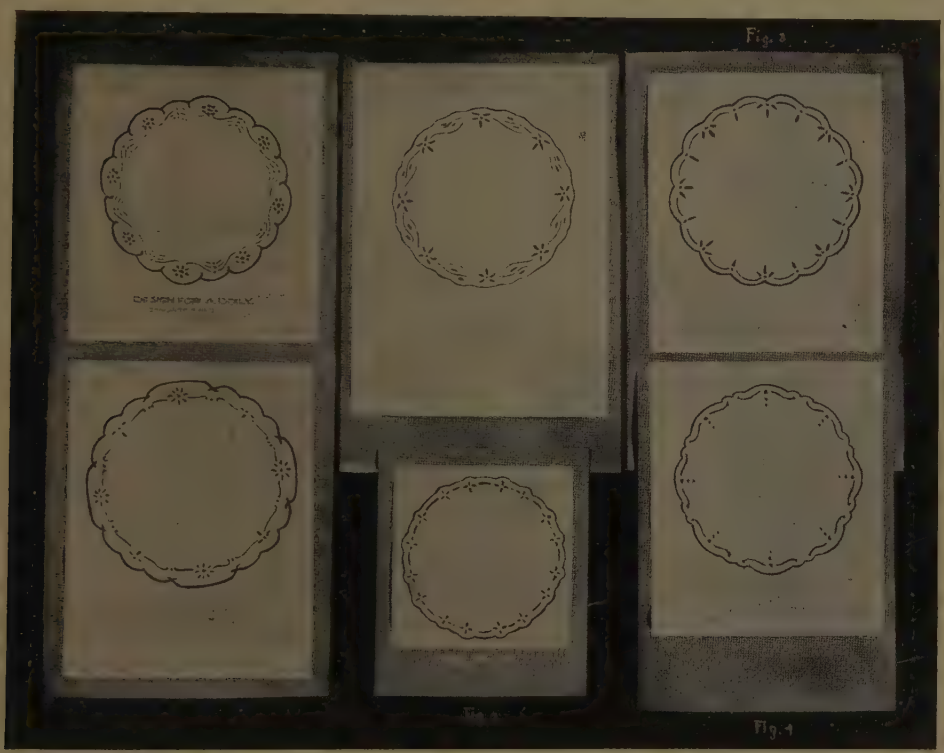


be seen incidentally, so to speak; it should not require to be displayed. This rule applies even to architecture. But in that case the object is so large that the whole of it cannot be seen at once. It must be explored. One of the pleasures in great architecture comes from the placing of ornament so that it comes as a delightful surprise to the observer. But even in such cases it is placed with reference to structure and function. One never has to move an altar to see a window, or take up a font to enjoy the inlaid marble rosette beneath it! The order is (1) the idea of the thing, what it is for; (2) the most appropriate form, considering its use; (3) the most appropriate material, considering its form and function; (4) the most appropriate treatment of the material, to preserve and reveal all its natural beauty of texture; (5) the most appropriate ornament, considering all the foregoing conditions.

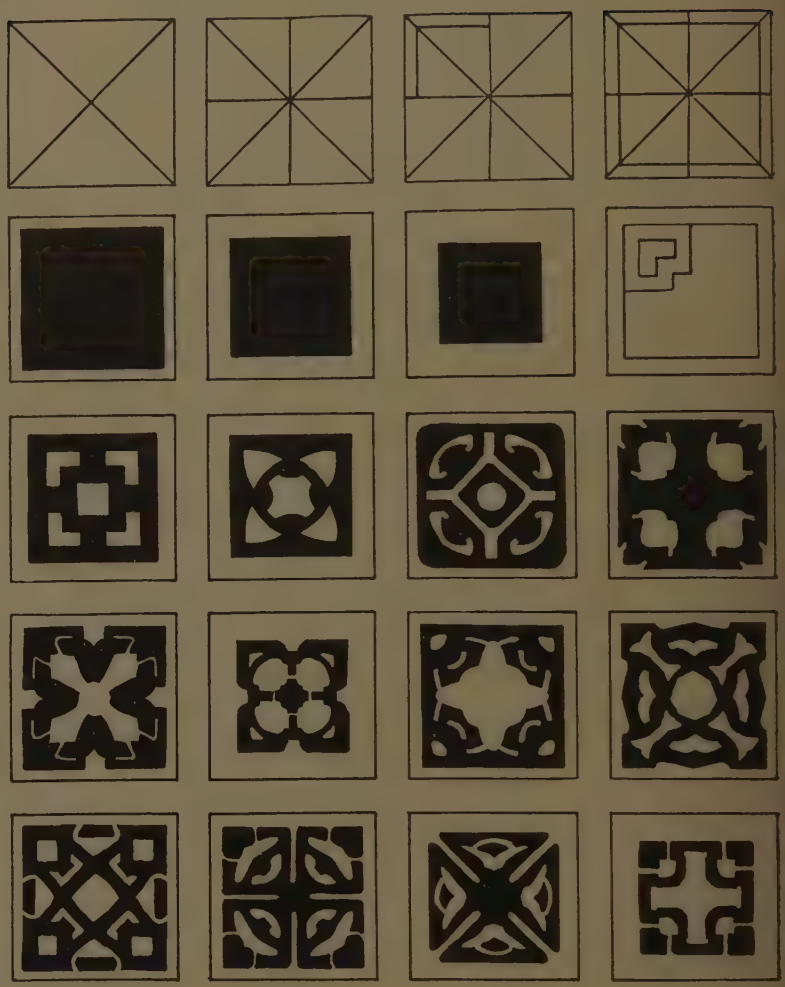
A PASTEBOARD BOX COVER. Suppose you have a square pasteboard box for handkerchiefs. You wish to ornament its cover with a distinctive design, merely to give it individuality, to make it your box, not another's. In this case the texture of the material, paper, is not of sufficient natural beauty to warrant its display. In other words, the entire surface may be broken up into pleasing areas. On pages 332



and 333 a few simple designs are worked out by means of folded and cut paper. At the top of each plate the method of procedure is shown in diagram. Let your experiments proceed as follows: 1. Decide upon the width of margin your cover is to display. Three different widths are shown in the second row of squares on page 332. Before coming to a final decision look



through the other illustrations, selecting those having narrow, medium, and wide margins, and see which seems to you the most pleasing. Can you decide arbitrarily upon the width of the margin without considering the character of the design as a whole? Would it be safe to say that a narrow margin requires small open areas in a design, and that a wide margin requires large open areas to balance it? 2. Decide whether the principal lines of your design shall emphasize its rectangular character by being parallel to its sides; or shall display its structural lines by emphasizing the diameters or the diagonals; or shall emphasize its multi-symmetrical character by making use of a sympathetic figure, also multi-symmetrical, the circle; or shall emphasize radial possibilities, all the parts arranged with reference to the center. 3. Proceed by experimental cutting. Cut several lots of them and compare them, selecting each time the best, being able to give a good reason for your selection. You will discover after a while that the most pleasing designs have certain well-defined characteristics: (a) They have unity; that is, they make their impression as a whole; neither the margin, nor the center, nor any one feature stands out obtrusively from the other parts of the design; (b) they present an evident order of arrangement; they are dominantly rectangular, or curvilinear, or parallel, or radial in character; (c) they present a consistent character of parts; the parts are dominantly bold or delicate, flowing or sparkling, somber or cheerful in effect; (d) the parts present a pleasing variety in measure. The same measure is not repeated except in a corresponding part. Parts which do correspond in character correspond perfectly in measure. For example, in the first completed design on page 333 the square-



shaped terminations of the units on the diagonals are alike. Those on the diameters are alike, but different in size from those on the diagonals, because diameters are not diagonals. In the last design on page 333 the scheme is an interlacing, somewhat like a weaving with ribbon or any other material. All the elements are therefore of uniform thickness; one measure is used throughout, while all the lengths of the parts, and all the spaces between the parts, are multiples of that measure. See Anatomy of Pattern, page 340, for a diagram illustrating this point. This pleasing variety of measure shows itself in what is known in music as rhythm, an orderly succession of accented beats in a measure. But this has been already explained on page 327. Unity of effect must be secured at any cost. If a spot is obtrusive because too large, break it up in some way, cut a hole in it, put a spot in it. If an area is obtrusive because too cut up, run several of the small spots into one and so simplify it.

If you attempt the interlacing effect, be sure to have your interlacing orderly. Every strand, if followed by the eye, should go over, under, over, under, without fail.

In designing your box cover you must remember that *color* has to be reckoned with. If your design is composed of many small parts, the color used may be more brilliant and present a greater contrast in value with the ground than in the case of a design composed of a few bold parts. The bolder and stronger the design the softer must be its colors and the slighter its contrasts when applied to an object like a handkerchief box to be seen at short range. The designs at the top of page 334, for example, should present the least possible contrasts of value, and the most delicate differences in hues between themselves and the background upon which they appear. In a word, soft and delicate colors, slight contrasts in value, and finely subdivided areas should characterize designs to be seen constantly at short range—strong colors, sharp contrasts, large areas are effective in designs to be seen at a distance.

Designs for box covers may be made richer by the use of several colors, as indicated in the lower plate on page 334. The most direct way to achieve a harmony of color is to begin with a

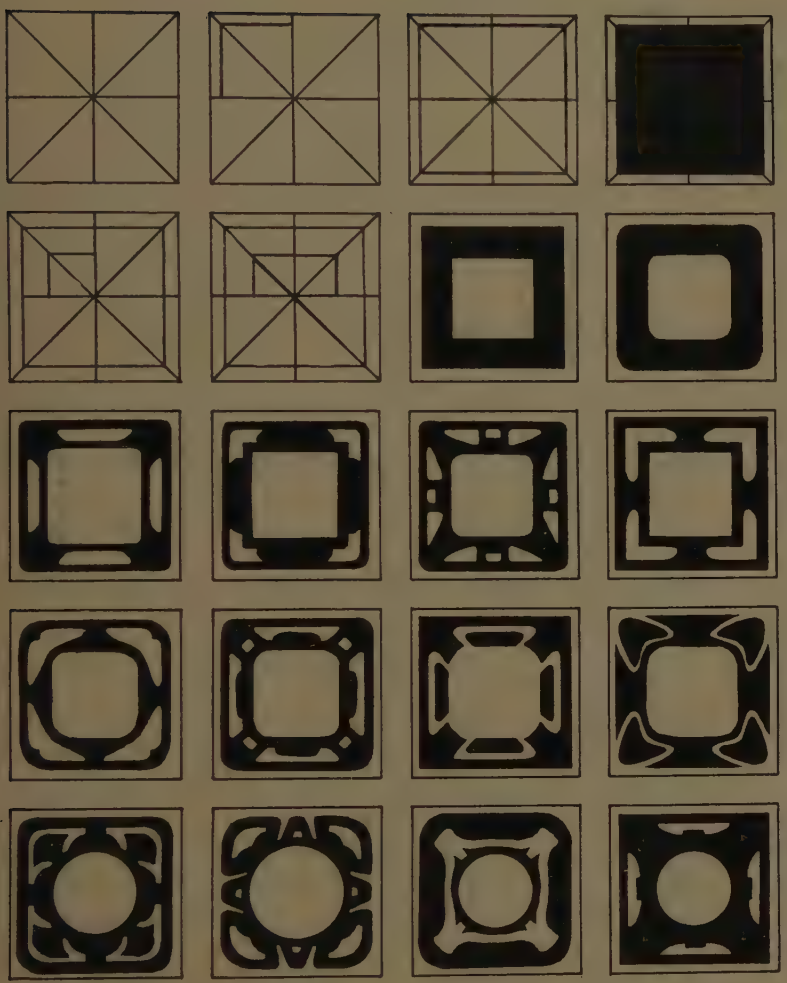
colored paper, and, having transferred the design to it, to color it with water color mixed first to the exact hue of the paper and then modified slightly with a little white (to make it lighter than the paper), or a little black (to make it darker), or a little of a warmer or cooler color to modify its hue and value just enough to give it a pleasant contrast with the ground color, but not enough to force it out of harmony with it. Tones harmonize when they have "something at least in common," as Dr. Ross of Harvard University has told us. If other tones of color are needed, they should be made by still further modifying the original color. In applying several different tones of color to the design, it is well to remember that as a rule the larger the area the duller its color should be; the smaller the area the more brilliant its color may be. The figure may be more brilliantly colored than its ground.

A LAMP MAT. Like the doily, a lamp mat when in use has its center occupied. But a lamp is a heavier and stouter thing than a finger bowl, and hence the ornament upon its mat may be less delicate. Moreover, the base of a lamp is sometimes square, or octagonal, or it may be hexagonal. In each case the mat should be designed with reference to the base of the lamp, and with reference to the table upon which it is to be placed. As a rule the lamp should influence the shape of the mat, the table its color. A lamp mat is primarily a protection for the table. The material used should be stouter, therefore, than the material used for the doily. Leather is suitable, for it is durable, easily cleaned, and not likely to be "mussed" by use. The chief element of beauty in leather is its texture. The delicate pencilings and modelings upon its surface give it a pleasant "feel" to the eye. A design to be worked out in leather should respect this surface. It should not break it up to such an extent that its beauty is obliterated. Tool marks are not likely to be

as beautiful as the natural markings of the leather. Your aim in making a design for your particular lamp is therefore to achieve a pleasing transition for the eye from the lamp to the table, preserving as much as possible of the natural beauty of the leather. The designs on page 335 offer examples, some for a square base, some for a round base. In each case only the lines banding white and black areas are to be tooled. The contrast in the finished mat would not be so great as that presented by the white and black. A delicate tint of some color, related to that of the lamp or table, will serve to enrich the effect of the mat without obscuring the texture of the leather.

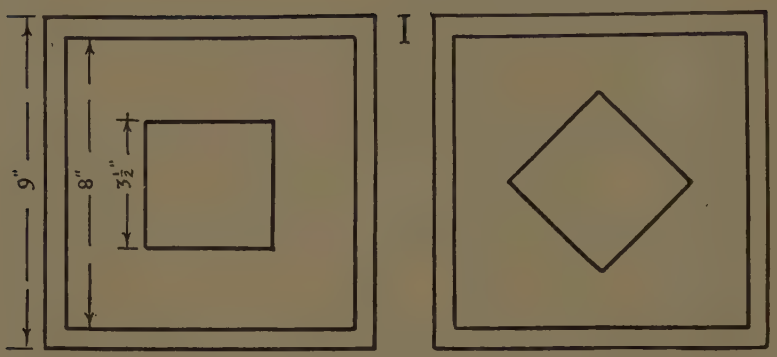
A SOFA PILLOW. A CANOE CUSHION. What is the idea? Something to make a visiting friend comfortable. Then why ornament it? When it is in use no one would ever think of looking at it; the friend is too important, he is the supreme attraction. But when not in use the pillow should be attractive, a pleasing thing to have about the house. The design allows of wide freedom of choice. It has but one or two restrictions. First, it must appear equally well any side up. The portrait of an Indian or of a pretty girl is therefore out of place. Second, it must not appear too fine to be used. Third, its material, make, and color must be appropriate to the place in which it is to be used. A pillow for your bedroom may be more dainty than one for your living room, and that in turn a little finer than one to be used on a porch, at camp, or in a canoe. Plate I, page 336, gives the dimensions of a diagram useful at the start in making a lamp mat. Doubling these you have a sort of typical size for a pillow. A pillow based on this diagram is shown above G, a form where neither the center, the border, nor the unornamented surface has been accorded first place. Other types of design are shown in the second plate. The ornament may fill the entire surface, as a rosette or as a surface pattern; or it may be confined to the border. In any case the law of radiating lines must govern every important part. The three designs in the lower row are for outdoor cushions.

A LEATHER POCKETBOOK. A WOODEN BOX COVER. At first these would seem to have nothing in common. But from the point of



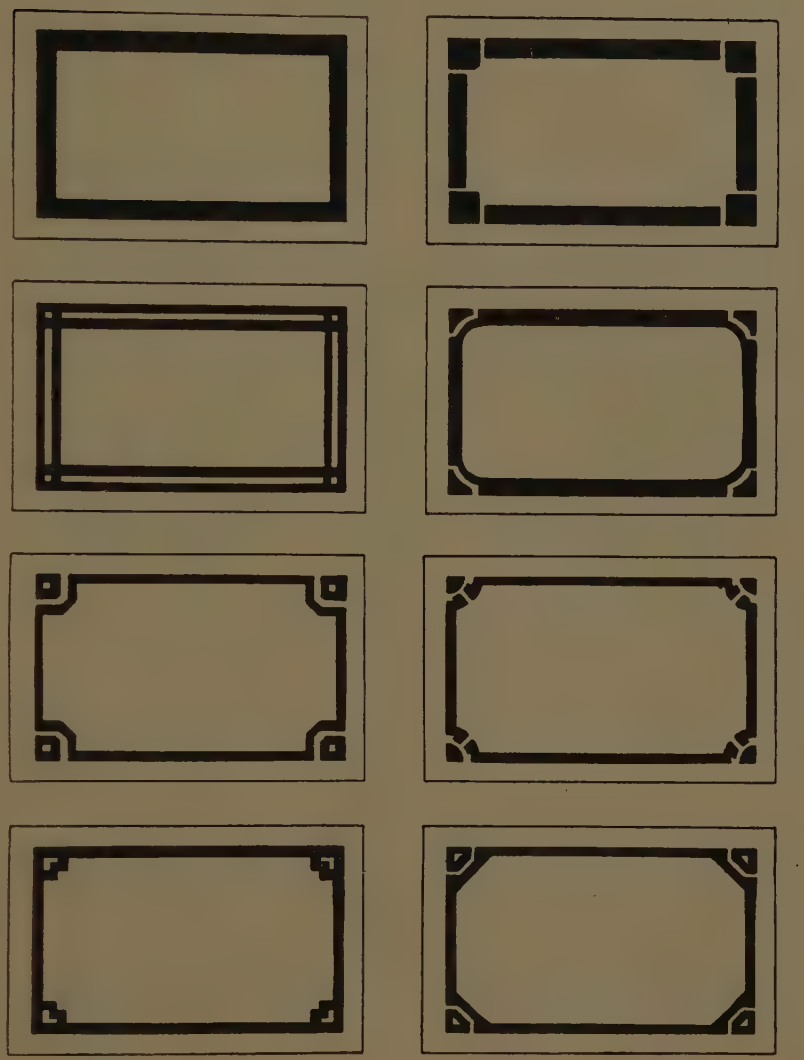
view of the designer they have, or should have, *beautiful surface* in common. In one case it is the delicate mottle of texture, in the other the exquisite variety of grain, brought out by the finish. The designer should never destroy one beauty in the forlorn hope of achieving another. His aim should be to enrich, to add another beauty to that which already exists. Upon the corner of a wooden box, or the cover of a pocket-book, cardcase, needle-book, or anything else made of fine leather, one of the most satisfactory forms of ornamentation is the border. Several of the simplest forms of border are shown in the plate. Decoration should reënforce structure by echoing or supporting its principal lines. The weakest part of the structure in a rectangular box is likely to be the corner. The eye is pleased, unconsciously it may be, when that fact is recognized in the ornament, and the corners are strengthened, that is, made a little more attractive to the eye. A corner is weakened when attention is called to the diagonal; its design must be bound together at the corner, — not literally, but in effect upon the eye. But here again you have the old problem of securing unity. The corners must not be *too* attractive. The border as a whole, in perfect relation to the area as a whole, that is the thing to achieve. The design may be applied to the box-cover by inlaying, incising, drawing, and coloring, or by burning. In any case, the same rule applies as in leather. As little as possible of the original beauty of surface should be destroyed.

A BRUSH BROOM HOLDER (page 338). Ask first in this case, as always, What are the conditions? The brush broom must be held in a position ready for use in the front hall, let us say, near the hatrack or mirror. The brush has a certain size and shape; it has a certain color, perhaps not in harmony with the scheme of the room and therefore to be hidden as much as possible; the holder is to be seen against a certain wall paper. We must decide also upon a durable material and make, and how the holder is to be attached to the wall. Given the brush and the color scheme as represented by the wall paper, and having decided upon material and make, you can proceed intelligently with the design. As the holder must hold, the principal lines of the ornament should suggest holding. The horizontal bands at top and bottom are



therefore to be emphasized, rather than vertical lines. The shape of the holder is that of the keystone: two sides are parallel and two are not. A repeating surface pattern is not pleasantly adaptable to such a space. A border would be better; but the contour of the surface,—of metal, leather, a fabric of some sort,—convex, but turning into the back at both sides where the ornament would be lost, suggests a different treatment. The use of a bi-symmetrical unit or group of units is thus suggested, both by the shape of the area and its contour. The motive of the decoration, if it is to be appropriate to the object, must be considered. Why is the brush used? To improve the appearance of the person, is it not? Then anything that suggests beauty is appropriate,—a flower, a floral group of units of exquisite line, a butterfly,—one of the most beautiful things in the world, or a group of graceful units suggesting the butterfly. Such forms are controlled by the law of bi-symmetry, and are easily adapted to the space presented by the holder. Ornament is well adapted to space when it seems happy therein,—not so large as to appear cramped for room, not so small as to appear lonely and lost in space. The coloring should bring the holder into harmony with its environment.

A BOOK RACK. You have already learned about the construction of book racks, and something about the decoration of their ends; but here let us consider the theory that underlies the designing of such decoration. Ordinarily the book rack has rectangular ends; but these may be modified indefinitely. On page 339 are two typical modifications, one emphasizing the structure of the rack, the other its purpose. By making the base wider than the top, strength is added where it is most needed, at the joint.



Such a form suggests that the holding of the book demands effort, to which the rack is fully equal. By making the top wider than the base a surplus of energy is suggested. The power to do the required work springs up superabundantly from below, eager to do all the work and more. But the disposition of the ornament within these surfaces is the particular problem in hand. Does the bisymmetrical form used in the broom holder seem equally appropriate here? The sides of this area are not to be returned to a back; they have to stand alone, unsupported, themselves supporting that which they hold. Look at the diagram, Fig. 19; compare its effect with that of the lines in Fig. 20. Which suggests the greater strength, the stronger holding together of parts? If the horizontal lines were needed in the broom holder, how much more they are needed here. And to them must be added the other strong lines, supporting, echoing the other structural lines of the rack. But the lines must not all conform too strictly to the structure; they must express freedom, grace, delight in doing the work they have to do; hence, where the structure needs their support the least, they are broken up into graceful forms.

THE ANATOMY OF PATTERN. Such is the title of a book by Lewis F. Day, a famous English designer of the latter part of the nineteenth century, dealing with the geometric structure upon which the distribution of ornament depends. Sooner or later the user of ornamental units discovers the need of such a structure both to save time and to insure a degree of uniformity. Such uniformity becomes absolutely essential in all such designs as are to be woven upon a power loom, or printed by machinery upon wall papers and dress goods. The pattern must "match." A piece of figured wall paper, for example, must have so accurately spaced a pattern that another piece cut from the roll anywhere must fit against it perfectly, continuing the pattern without a break. A little reflection will reveal how accurate such printing must be. The plate on page 341 gives the basic form of repeat, that on which all other

forms are based, even the bewilderingly complex forms developed by the oriental peoples and carried to the limit by the Moors. The square is, as you see, the indispensable factor. The surface which becomes the field of the design, whether border, rosette, or diaper pattern, when subdivided by means of a network of lines, one series of parallels perpendicular to the other, furnishes the means, not only of locating accurately repeating units of any and every kind, but of reproducing any pattern any size, larger or smaller. The pattern F, for example, could easily be reproduced one-fourth its present size by drawing the units in corresponding squares in the net C. Moreover, the net is useful in securing good proportions in repeating units. In D, for example, the two units and the space between them have one square as the common divisor of the pattern. They stand in the orderly relation to one another of 1, 2, 3. In E the length of the side of the corner unit is to the length of the side of the side unit as 4 to 5. This orderly relationship in the measures of the various parts is one secret of the enduring beauty of the Greek frets, of which B is an example. All designs for textiles where the ornamental features are produced by variations in the weave, such as ginghams, plaids, brocades, figured silks, suitings, blankets, carpets, etc., must be worked out in the terms of the net, each horizontal and vertical series of squares representing a thread, warp, or woof. See page 340. The three illustrations in the lower plate, page 341, show how natural forms are interpreted into woven forms by means of the net. Such forms are said to be "squared up." The young bird, the fish, and the tree preserve enough of their identity to be recognizable, though forced to live on the square, so to speak.

The larger plate on page 342 shows squared-up designs applied by weaving or by cross-stitch embroidery to belts, and to other common objects. Under such conditions curves cannot be introduced successfully, except as crude approximations composed on the net of the weave. Of course if the weave is of very fine threads, as in the case of fine lawn, linen, or silk, the approximation may be much closer. The curves and circles in the doilies, for instance, show as curves because the mesh of the weave is so fine that individual threads are lost to the eye.

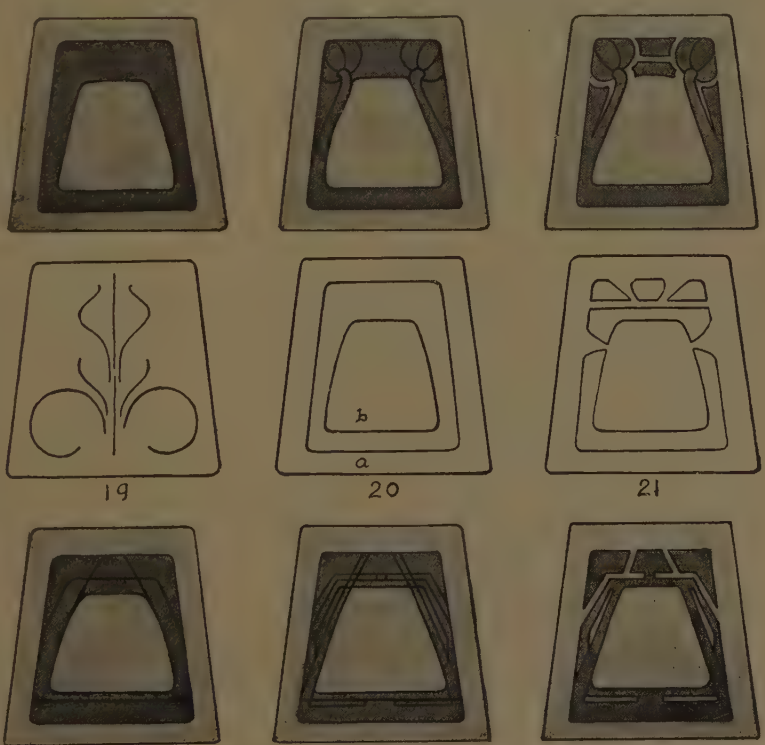
The chief beauty in a woven pattern lies not so much in its form as in its color. The pattern is often but a device for distributing the color. In making such a thing as an embroidered belt, color must be of first importance, and its pleasing distribution of second importance; the contours of the units used is of comparatively slight importance.

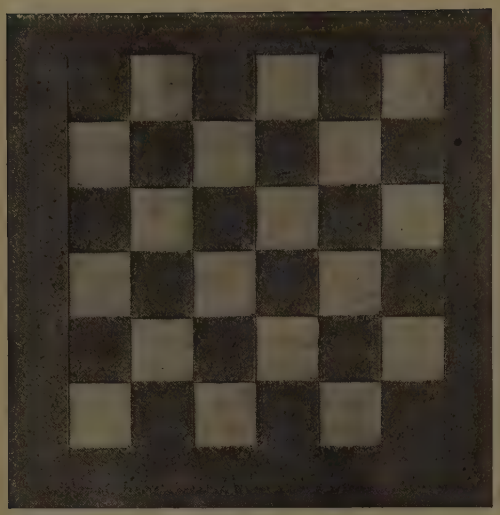
Balanced arrangements. Designs which are not borders, or surface patterns, or rosettes, take on forms which may be conveniently considered under the head of Balanced Arrangements. They include designs within panels or other limited areas, designs like florettes, without geometric inclosing lines, wreaths, etc., such as those shown on this page. All these have this in common: they must appear to the eye to be well balanced, symmetrical,

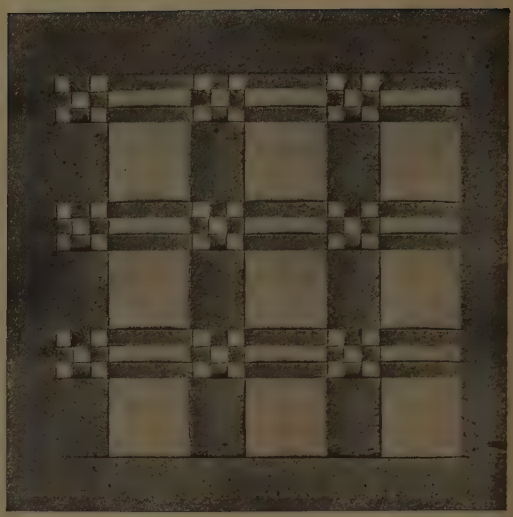
not "one-sided." To secure this effect the elements on one side the vertical axis may be the exact reverse of those on the other side, as in the ornament on this page, or on the previous page, 338; they may be about alike, and approximately opposite, as in the first "Merry Christmas" design and the last wreath, page 343; or they may be freely balanced, as in the first holly spray, the second "Merry Christmas" design, and the "Santa" within a circle. In embodying this principle, free balance, as it is sometimes called, the law is that of the steelyard. It cannot be worked out mechanically, with success, except in its most elementary form. It must be felt out. The eye must be trained, by experiment, to know instinctively, so to speak, when the balance is secured. A good practice is illustrated in the lower plate, page 343, where, in the three book-covers, the elements used in the design were first cut from paper so that they could be easily moved about until properly adjusted to one another and to the whole to give the effect of perfect balance. The practical applications of this principle exemplified on page 343 are mostly in the form of CHRISTMAS LABELS, such as one can easily make for packages.

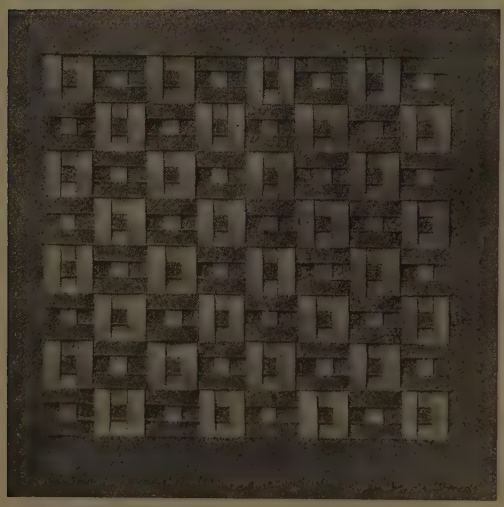
JAPANESE LAMP SHADES. The principle of balance is still further exemplified in the lamp shades on page 343, made by children, but after Japanese models.

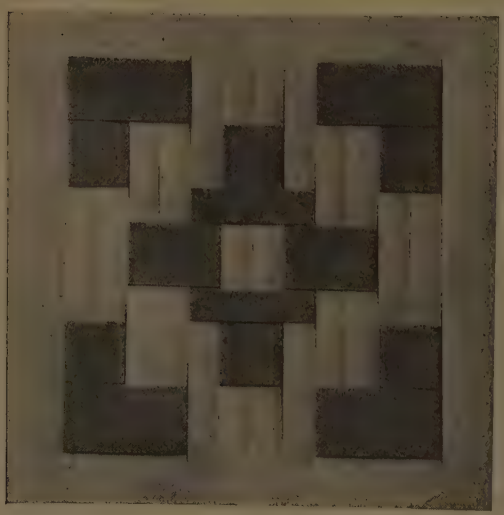
In the lower of the two the whole is balanced through having an equal number of similar panels on each side the central axis of the shade. But the panel taken by itself presents a balanced effect also. In the upper one each panel is balanced, but no two are alike. Moreover, the ornament is so disposed that when the completed shade is viewed from any side it will present a balanced effect to the eye. No other people in the world are so successful as the Japanese in exemplifying this principle in the realm of decorative art. Notice how the tip of the bird's wing thrusts itself into the otherwise empty corner of the last panel, and thus completes the balance of attractions. Perhaps the most interesting example of balance is the central panel in the upper shade. Here all the ornament is at the left, but the harsh, unrelieved lines of the panel at its top and right side, and the blank space near them, constitute such powerful attractions to the eye, especially with

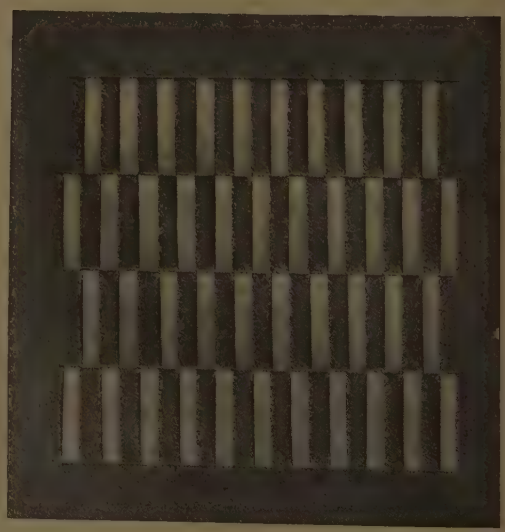


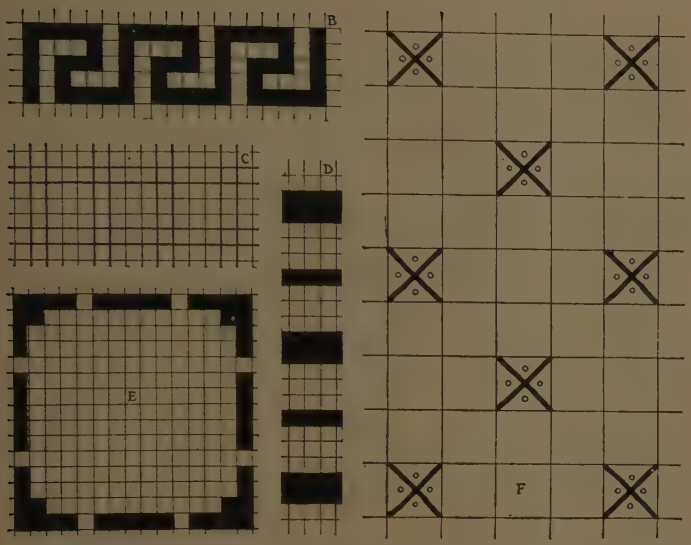












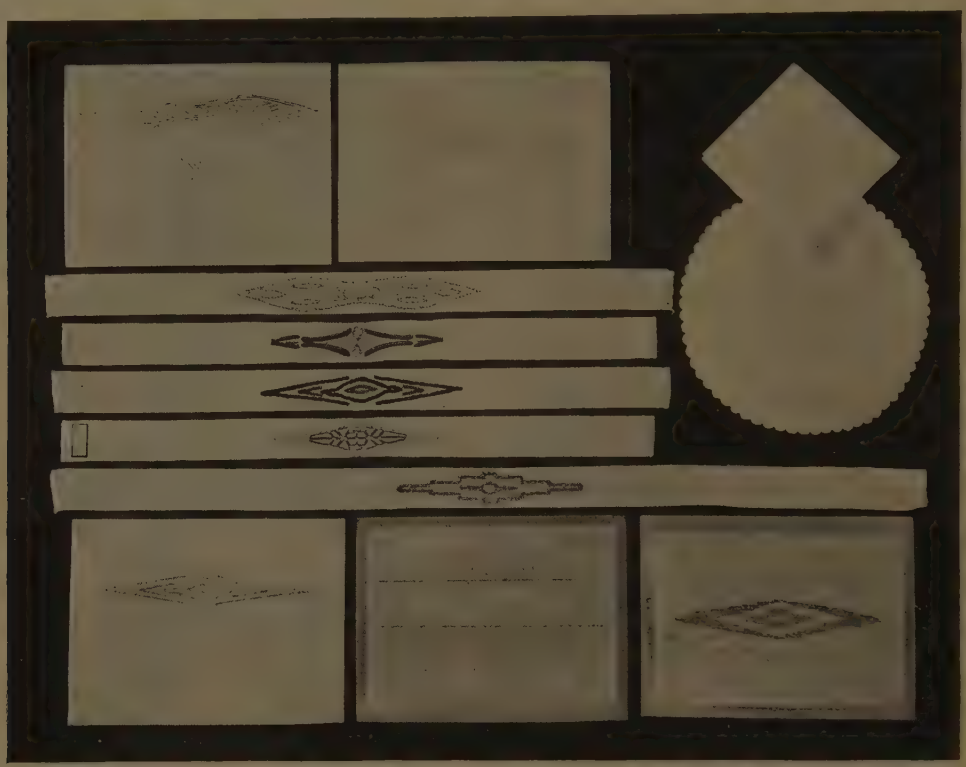
that interesting bird in the next panel, that the eye accepts the arrangement as being entirely satisfactory. Shades of this kind may be made upon a basis of rather stiff, tough cardboard, like "oak tag." The frames should be gotten out in the form represented by the darkest portions. This should be covered with paste on one side and placed, paste down, upon a sheet of Japanese paper, or bond paper, something that will admit of the passage of some light, but not transparent. When dry, the thin paper may be trimmed to correspond with the outline of the shade. The panels may now be painted, and the frame made any desired color. When dry the two radial edges may be fastened together by means of strips of paper pasted over the joint, and toned to the right color. The shade may be mounted on wires to support it about the lamp. Sometimes an old shade will furnish the framework, and the paper shade may then be designed to fit it. The Japanese do not object to a floral motif for lamp shades. If one is to have a shade with "peculiarly appropriate" ornament, geometric motifs, suggestive of crystals, fire-formed, or insect motifs, suggestive of the life always attracted by flame, might be more satisfactory. The coloring may be much more brilliant in the panels of a shade than upon a book cover or upon the wall. The strong light from the lamp shining through the paper will "fade out" light and delicate colors, and make the design ineffective.

PLACE CARDS. These attractive little objects, that add so much to the enjoyableness of a dinner party, are good subjects for design, with the principle of free balance in mind. The set on page 345 was designed for a Thanksgiving dinner. The turkey, and his "wish-bone," the pumpkin for the pies, the cranberries for the sauce, the celery, the dessert, with various fruits and flowers, have all furnished motifs for the designs. These were drawn in outline with reference to coloring in water color. The names are supposed to balance, in attractive power, the other ornamental details, when properly colored. No matter how unbalanced such a design may appear in outline, it can always be brought into balance when the color is added. Brilliant color is always more attractive than dull color or gray. A single spot of bright red will balance a whole area of temperate coloring. These particular designs are drawn in such a way that either the pattern or its background may be charged with color. In making such designs you must keep in mind the principle of consistency. Each part of the design must be

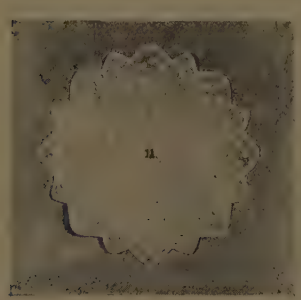
equally conventional, both in form and color. It would not do to have a conventional leaf with a naturalistic dish in the same design.

EASTER CARDS are also excellent subjects in this class. Of course you can use the familiar

PATRIOTIC SOUVENIRS. All sorts of things appropriate for use on Washington's and Lincoln's birthdays, on Patriots' Day, Memorial Day, Flag Day, Independence Day, Labor Day, Columbus Day, and other festivals,



chicken, and the flower peeping from its grave in the earth; but one of the finest symbols of Easter is the butterfly or moth. An insect offers possibilities in coloring that rival those of the Easter millinery. In the illustration, page 345, but one out of a possible hundred, the principle of consistency in interpretation has been well exemplified. Both cocoon and moth are equally conventional, and both have been brought into harmony with the conventional twig. Notice also how well the principle of balance is observed.

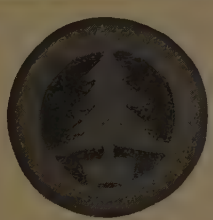


offer inviting opportunities for design. The symbols given on page 346 are appropriate for use on programs, tickets, posters, booklets, decorations for the hall, etc., on Patriots' Day. They are treated conventionally, of course, to bring them into harmony with type, or to adapt them to the requirements of coloring. In all such designs material of local interest should be incorporated, whenever possible. In Marblehead, Mass., for example, is a powder house quite as pleasing in form as that at Somerville, which would be used, of course, by the designer of printing or of decorations for a patriotic function in Marblehead. In Plymouth, Mass., you would use the Rock; in St. Augustine, the Gates; in Helena, Mont., the Gulch Cabin; in San Antonio, Tex., the Alamo; in Newport, R. I., the Old

might be repeated in the decorations for a hall draped for the occasion. All the other symbols would have to be still further simplified if repeated, except Paul Revere and the Minute Man, and those are too individual to be repeated anyhow. It is only elemental and abstract things, like the cube, or the egg and dart, or the bead and roll that we can stand repeated indefinitely in dentil moldings, or in the echinus, or the astragal.

Stone Mill; in Chicago, Ill., Fort Dearborn; etc. In every place there is something. It may be a piece of furniture, a bit of wearing apparel, a weapon, or other relic. The skillful designer will seize upon it, whatever it is, and get from it a symbol, adapted for use as a single ornament, a unit in a border, or a surface pattern, or within a decorative panel. You must remember this in whatever you do in the way of translating an object into an ornament, that the more complex the symbol the less it will stand repetition. As a rule the human figure or a face should never be repeated. One would weary of seeing even as conventional a head as that at 7, page 346, repeated in a border or surface pattern. In fact there is hardly a symbol in the plate that should be repeated upon a program cover. The eagle

BOOKPLATE DESIGN. A bookplate is a little device for marking and identifying every book you own. The bookplate is not of recent origin, for it dates back to or possibly beyond the thirteenth century. The first artist of note to make bookplates was Albrecht Dürer, who was born in 1471, and the earliest known plates were made in his native country, Germany. The bookplate is affixed to the inside of a cover of the book, usually the front cover. It should proclaim not only the ownership of the book, but the mind and good taste of the owner. A



few hints about what to include and what not to include in a bookplate will make clearer to you the method of procedure. Cheap bookplates, thoughtlessly executed, are worse than none at all.

The earliest known plates were engraved upon wood blocks, from which the impressions were taken direct. Of course, the lettering in this case had to be reversed on the block in order to print rightly on the paper. In the best days of the older bookplates, when, following the darkness of the Middle Ages, the torch of learning flamed afresh, and its light streamed out from the printing house upon all mankind, the copper plate was the means by which the design was printed. It grew into great popularity between the years 1750 and 1820. The artist cut the design into a smooth plate of copper. The incised lines were then filled with ink and the surface of the plate was wiped clean. Paper pressed upon the plate pulled the ink out of the incisions, and the prints were thus made. The bookplates of the eighteenth century partook of certain recognized styles, as the Jacobean, of the Wreath-and-Riband; and in many cases, as only the wealthy owned enough books to have them so marked, the coat-of-arms of the owner formed the chief motif. But the owner's name, together with the Latin words *Ex Libris*, was the constant feature in these designs. The English of the Latin means, "From the book of," or "Out of the library of" (the owner). Hence the inscription "John Black, Ex Libris," or the same words reversed in reading. These older bookplates, while works of exquisite art in some ways, are not to be preferred to the well-designed bookplate of the nineteenth century for use in your books and mine. A good bookplate tends to invest a book with an additional value; it discourages indiscriminate borrowing of books, checks the loss of books, increases the desire personally to possess books, and leads to greater care in buying books, for it makes them seem worth owning for a new reason. Let your bookplate be well designed. It must express yourself in some way.

The motif should be something that belongs to your own personal life. It may properly reflect your favorite study, your aim in life (if that has been definitely formed in your own mind), or your special tastes. It might embody a symbol of what you would like your life to stand for. It might be whimsical, witty, amus-

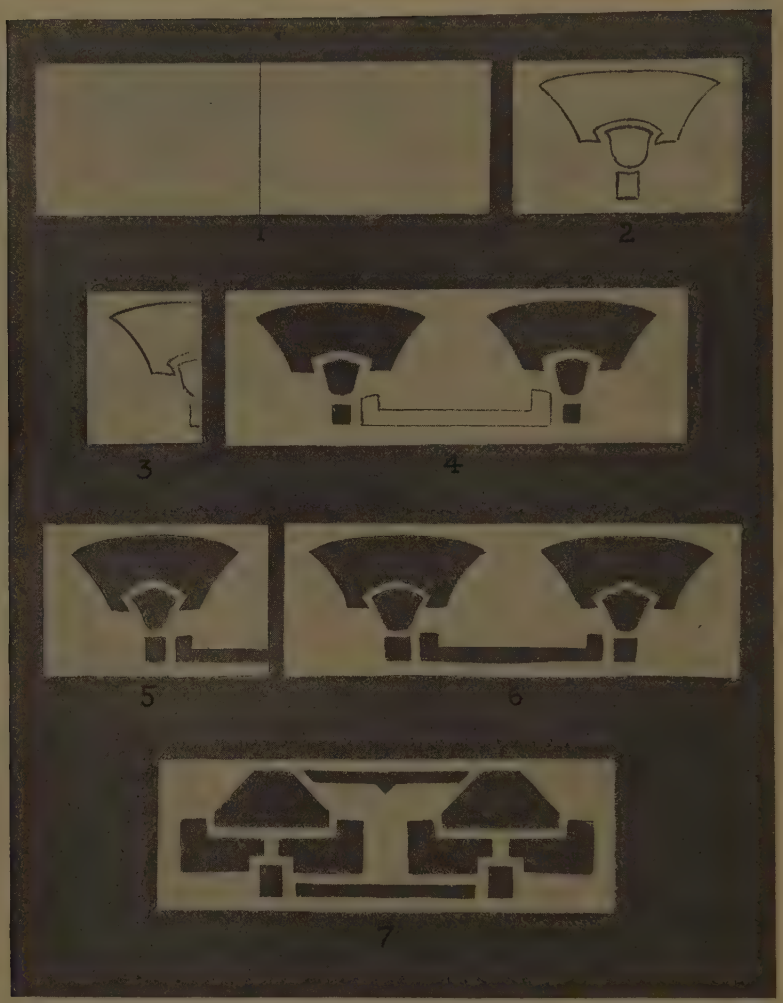
ing. The specimens of bookplates, page 347, by Mr. R. J. Williams, an English artist, furnish examples of all these. If your family of old bore arms, then the family blazonry may well occupy a part of the design, but never the whole of it, nor its most dominant feature, for the days of heraldry are over for the mass of mankind. You should cherish your coat-of-arms only as a family memory of which you have a right to be proud. It should never be used, however, unless your own descent from the arms-bearing branch of your kin can be established without trace of doubt. The plates reproduced are almost entirely suited to children. Can you not, by studying the plates, determine the character of each person represented? One is fond of the sea, another of cricket, a third of fishing. W. H. Law is a yachtsman; Harry Low loves things that fly high! Lilian and Grace and Muriel are fond of flowers. Minnie loves the beautiful old things. Irene would have her life like an evergreen tree. Arp and Hill like outdoor life; Anna and Florence love books; Annie Webb loves art, or is an artist. But whatever the units chosen and developed, note that the design in all cases holds together as a unit and is well balanced. Ornament and lettering have something in common. Una Cope has used a delightful old Saxon border, and an old Saxon letter, suggestive of the learning of the early priories of Britain, and has borrowed from the spelling of Chaucer's time in her legend. Florence Wood has injected a bit of humor into her plate; so has Anna Braica. All these designs were drawn in black ink for reproduction by the "line plate" process, as etching on zinc is sometimes

A few Symbols appropriate to Patriots Day: 1. Old Powder House at Somerville, Mass. 2, Silhouette of the Minute Man at Concord, Mass. 3, Silhouette of Paul Revere. 4, The Eagle, decorative, symbol of the United States. 5. A Powder Horn. 6, Flag used by Americans at Bunker Hill. 7, Revolutionary Head-piece. 8, A Flint Lock. 9. A Sword.

called. A plate of this kind can be had for about $1.50. From it any number of impressions may be made on an ordinary printing press.

STENCILING. This method of reproducing units of design has already been described, though very briefly, on page 126, in connection with the making of a stenciled border for a desk pad or blotter. The process is worth more than a passing notice. Border designs such as those shown on pages 348 and 349 will serve to make clear a method of designing useful stencils and of applying ornament to various fabrics by means of the stencil. In working out a border, the design should first be laid out full size. The character of the decorative material and the number of repeats must be determined at the outset, and the whole planned with reference to the "bridges," the portions of the paper of the stencil that must be left that the stencil may keep its shape, hold together in one piece, when in use. It is well to begin by experimenting. Cut a piece of paper, Fig. 1, page 348, bearing a definite relation to your sketched design, — a half, a third, a quarter of the whole, or some fraction of it. Fold this and draw upon one side your unit, Fig. 2. Fold again for cutting as shown at Fig. 3. Cut out your unit, unfold your paper, as shown at Fig. 4, and draw in your connecting unit, establishing the most vital and pleasing relations possible between all the elements. The paper may now be folded again, as shown at Fig. 5, and the connecting unit may be cut. When the paper is opened it will appear as at Fig. 6. Cut several others, varying the proportions of the chief units and of the space between them, and varying the character of the connecting unit. From these select the one which seems to you best, the one in which the space between the units is as pleasing as the units themselves, the one which seems "all of a piece" — a border, not merely a row of things alike. The addition of a second connecting unit, as shown at Fig. 7, may give greater coherence to the design and produce a more pleasing space-unit between the form-units.

EXAMPLES OF PEN-DRAWN BOOKPLATES REPRODUCED BY THE "LINE-PLATE" (ZINC ETCHING) PROCESS. DESIGNED BY MR. R. J. WILLIAMS, ENGLAND



Notice that the design exemplifies consistency in its measures, almost like a Greek fret. In a fret, a single square is the unit of measures for every part of the design, the form-units and space-units alike. Each part is a multiple of that unit. Here all the "bridges," all the narrow spaces between units and parts of units, are alike. Notice also that but three directions of line are used — vertical, horizontal, and oblique at 45°. This reducing of all the lines to three sets adds greatly to unity of effect, and peace in the relation of parts. When curves are introduced they must be governed by the law of radiation, from a point within the unit, or below it, or above it. The radiation should not be too obtrusive in effect. It should be felt rather than seen in its mechanical completeness. On page 349 are other examples of stencils, for use in making borders. In each case just enough of the pattern has been cut to make easy the correct placing of the stencil for insuring uniform spacing in the repeat. When the preliminary stencil is right, place it upon a piece of thick manila paper, or stencil paper, such as may be purchased for the purpose, and with a sharp-pointed pencil trace the design. This design should now be cut by means of a sharp-pointed sharp knife. Some designers cut on a plate of glass, others on a sheet of zinc. A perfectly smooth hard-wood board will do. In any case the knife must be kept sharp, the cuts must start and stop at exactly the right place, and the waste must come away clean from the stencil, leaving no hint of a ragged edge or corner anywhere.

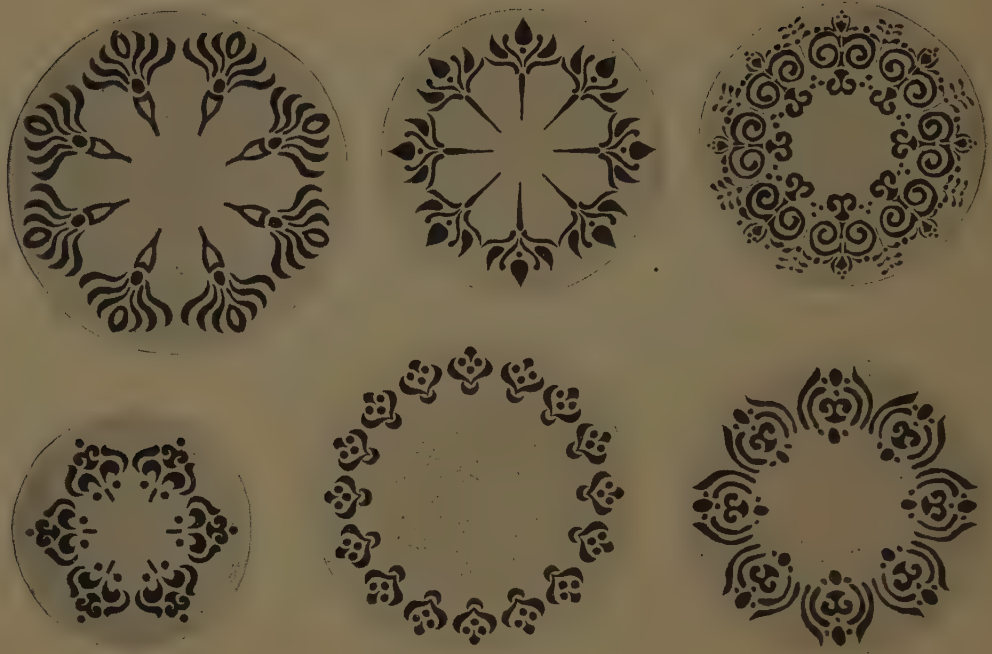
The other plates on page 349 show a drawing, a stencil representing one quarter of a radiating design for a sofa pillow, and the cloth itself with the design stenciled upon it. There are several good ways of using the stencil: (1) If the pattern is to be transferred to paper, it may be done by means of a sharp pencil. In this case a fine outline will be the result, which may then be filled in by hand with color. (2) If the pattern is to be transferred in color direct, the stencil, if not made of stencil paper, must be quickly dipped in melted paraffine and pressed flat. When dry it may be used with either oil color or water color, for the paraffine will protect the stencil from the liquid color. Transparent and body water color may both be used upon occasion.

object rather than the substance of the object itself.

In the home, stencil decoration is applicable to almost every textile object. Curtains, draperies for windows, beds, cupboard doors, etc., table covers, mats, doilies, wall papers, various articles of wearing apparel, not to mention articles made of wood, are all open to enrichment by means of the stenciled ornament. Such work must appear in moderation, however, and only where most evidently appropriate; otherwise one

Frequently the best medium is oil color thinned with gasoline. It should be applied by "pouncing" with a stiff-bristled stencil brush made for the purpose, although a large bristle brush, such as is used by artists for oil painting, will do. (3) Wax crayons may be used, the pattern drawn in outline through the stencil, and filled in without it, or filled in completely through the stencil. Upon cloth wax colors may be "fixed" by means of a hot iron. (4) Another method is that of spraying. The coloring material, thinned to the consistency of water, may be applied by means of an atomizer. This method is to be recommended for delicate goods to which ornament is added, automobile veils, silk curtains, etc. It has the additional advantage of making possible a limitless variation in hue, giving prismatic, iridescent, ephemeral effects of the utmost delicacy.

The application of color of any kind to fabrics, by means of stencils, has its æsthetic limitations. It should never be applied in such a way that the original texture of ground, the fabric itself, is obscured; never so that one thinks paint when looking at the completed



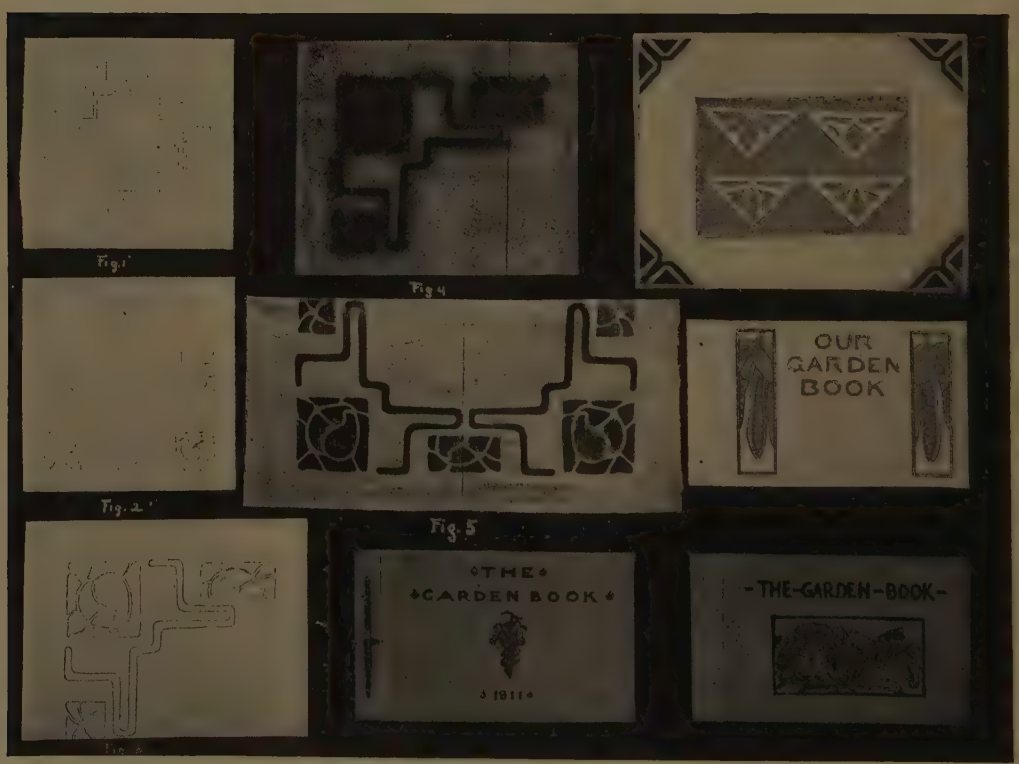
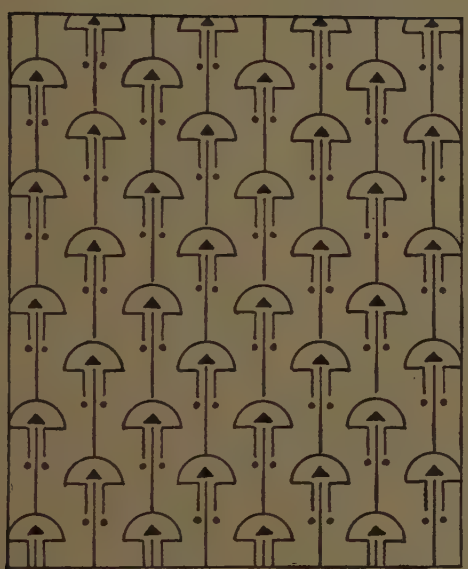


Fig. 1
Fig. 4
Fig. 2
Fig. 5
OUR GARDEN BOOK
THE GARDEN BOOK
1911
THE GARDEN BOOK



soon becomes tired of it, and it appears cheap and tawdry. On page 350 are several table mats with stenciled decoration. Here is the border bent into a wreath. The method of producing such designs is comparatively simple. By reference to page 76 you will be able to refresh your mind as to how to cut polygonal designs. The paper, folded to produce the number of repeats desired, will enable you to experiment with your units until a satisfactory grouping is secured. A segment of a circle wide enough to take at least two units, and long enough to include the center of the design, may then be made from stencil paper, fastened by means of a pin through its center of radiation and the center of the circular mat, and used to produce in rotation the entire design without the slightest trouble.

The source from which units of design for use in stencil patterns may be derived is Nature. Every bud, leaf, flower, shrub, tree, furnishes ample suggestion. To simplify these forms, to translate them into the necessarily conventional forms of the stencil, is a fascinating adventure. On page 351 are designs derived from seed pods, by grammar school children averaging eleven years of age. Above them is a plate that hints at the possibilities of bird forms. In interpreting such forms the "bridges" should be placed where they will interfere as little as possible with the natural form. In the hands of a skillful designer the bridges may even become a help in expressing that form. In this case, for example, the wing and the tail are defined by bridges, and the junction of the leg with the body is made emphatic by means of them. Still further illustration of this point is to be found in the plate on page 353, where the petals of the rose forms are defined by the bridges. In this case the spot could hardly be made intelligible in any other way.

The stencil is used often merely to fix the position or the contours of some repeated unit, to be filled in by means of embroidery, or inlaying, or to be pierced or embossed. The lower plate on page 350 shows designs, transferred to the material by means of the stencil, for outline-stitching, solid embroidery, paint-

ing, and piercing in metal. One of the most expeditious ways of lettering is by means of stencils. These are made for commercial purposes of thin brass; but if the letters required are not too small, they may be cut in stencil paper, a single letter on a sheet, with dots pierced at left and right to assist in the spacing.

BORDER DESIGN FROM RAMBLER ROSES IN PINK--LEAVES & STEMS GREEN

PLUM TREE DESIGN
LEAVES GREEN, BRANCH BROWN, PLUMS VIOLET.

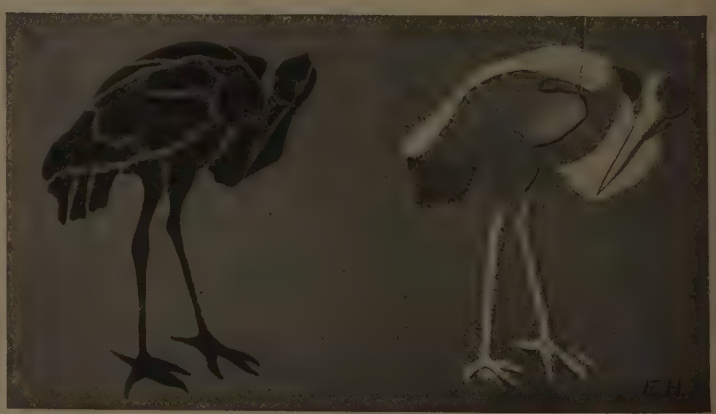
The plate on page 352 illustrates still further the possibilities of the simplest sort of stencil. The one thing for the designer to remember is, as has already been said, that his bridges must help to interpret the form of his motif, whatever it is. The three upper units in the plate were derived from spring growths; the large central unit in the plate, from a butterfly upon a flower; below this at the left are two other leaf clusters; below it at the right is a crab near a bit of seaweed. How lifelike appear the beetle and the grasshopper! The rooster, the young crow, the baby hawk show with how much spirit bird forms may be translated; while the squirrel, the greyhound, the kangaroo, and even the old dragon at the bottom of the plate seem charged with life to their very tip ends.

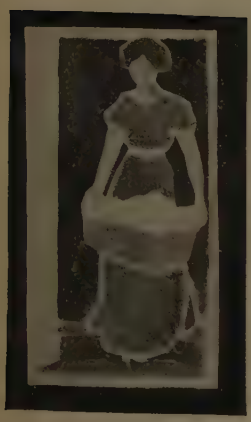
The plate hints at the possibility of securing a polychromatic effect by means of one stencil. Changes in color are always possible in the use of the stencil, by the first and third method described on pages 348 and 349, but are not so easy by the second method. The liquid is likely to spill over from one space into another. By the fourth method mosaic effects in color may be produced by covering with paper temporarily any portion of the form that should have a different color. In case of the rooster, for example, the tail, head, and feet would be covered while the body was being sprayed; then the body spaces would be covered with paper while the other portions were being sprayed.

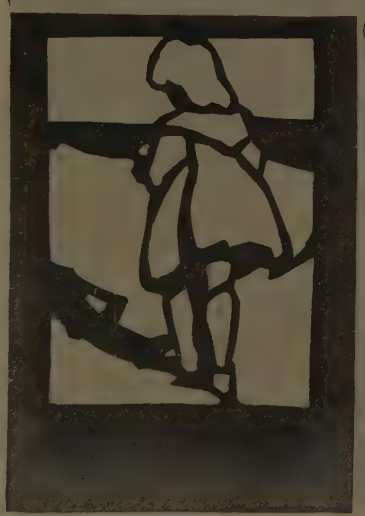
When using oil and water color it is best to have a stencil for each color to be applied. In this case a key stencil is made; that is to say, the entire design is cut as if it were to be stenciled in one color. From this, other stencils are traced and cut, one for each color, with such small incisions in addition as may be necessary to aid in adjusting the pattern.

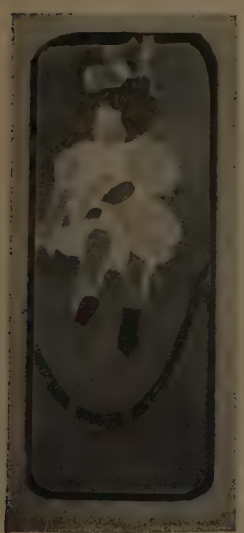
tration in the plate shows another possibility in the use of the stencil, namely, the suggesting of a third color without actually using it. Since the days of Chevreul, the great French chemist, the peculiar effects of simultaneous contrasts of color have been noted and utilized. Spots of gray on a red ground will appear tinged with green. A ribbon striped with blue and black will appear brown with blue stripes. After gazing at a red sun just before sunset, one sees green moons in other parts of the sky! The law is that an active color, a strong or brilliant color, tends to force its complementary upon a neighboring passive color. Even in the illustration referred to an effect according to this law is to be seen. The forms of the lilies inside the dark oval areas of the leaves appear somewhat brighter than the paper outside. This is because, completely surrounded by dark, they appear whiter by contrast. If these leaves were strong purple the lilies would appear yellower than the surrounding surface of the paper. Such a pattern as this cannot be cut as a stencil, however, without having recourse to a Japanese device for holding in place the portions represented by the white spots. That device consists in tying the spots in place by

The colors in such cases must be very carefully selected. They must not present too much contrast. If the contrast in hue is great, the contrast in value should be less. If the contrast in value is great, the contrast in hue should be very slight, or not any. In other words, the harmony will be better if both colors are taken from the same scale, the extreme light and dark of the colors making contrast enough. In any case the color scheme should have a dominant tone; and usually the tone of the cloth or other fabric constituting the background should play a part in that scheme. The central illus-



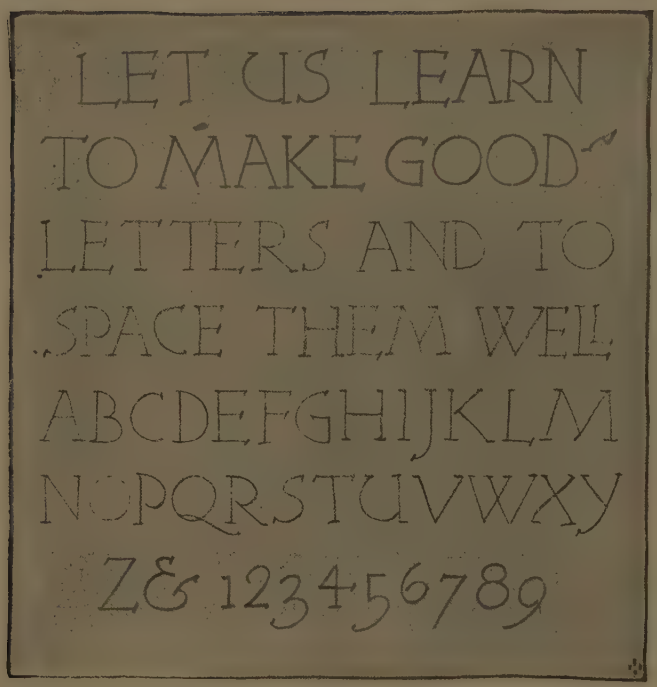






means of fine, strong threads, so fine that when the color is applied over them they do not arrest enough of it to leave a blank upon the ground.

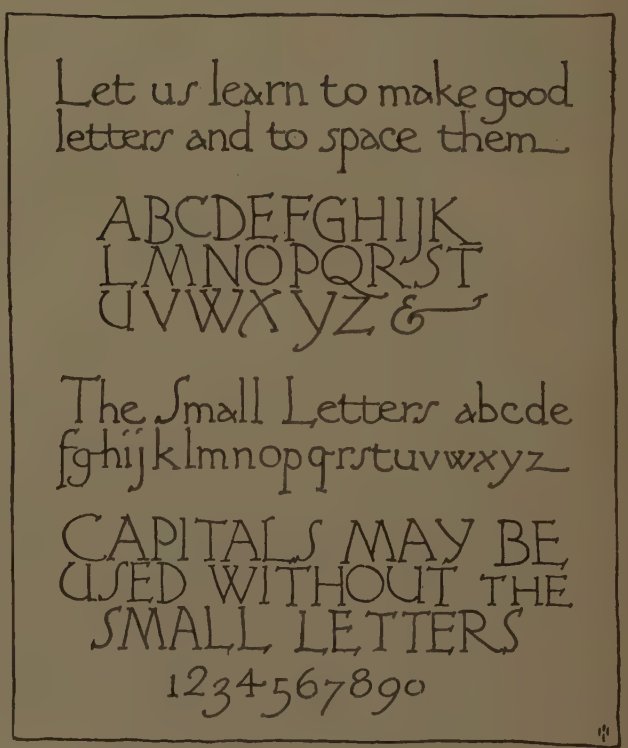
A complex ornamental form, like the upper one on page 354, is sometimes pounced in several colors. The lighter color is put on first, strongest in the center, let us say, and gradually thinning out toward the edges. A darker color is then pounced on, strongest at the edges and thinning out toward the center. Beautiful color effects, like those to be observed in the leaves of certain oaks when they change in the fall from red to green, are often secured by this

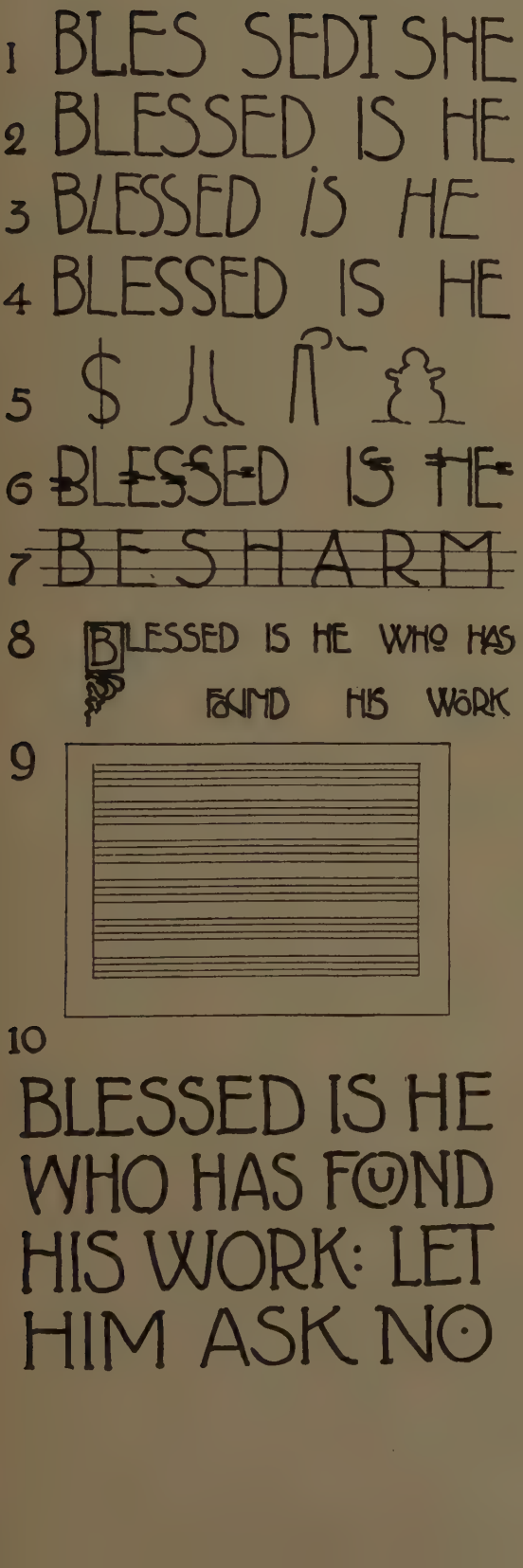


sign, a little more latitude is possible in the coloring.

PICTORIAL STENCILS. The art of stenciling is not limited to elementary design. A, B, C, and D, on page 355, show four interpretations of the same subject into the form of a pictorial stencil for one color. The four other illustrations show stencils in two or more colors. The method to be followed is that already described: a key stencil, and from it the necessary color stencils, one for each color. Use oil colors or dyes and a stencil brush. When the brush is filled with color, wipe it "clean" and use it with a rotary motion. Benzine, gasoline, or turpentine dropped into the brush after it has been charged with color, and then drawn out by means of a blotter, will take with it the excess of oil from the paint, leaving it in the form of an almost dry paste, thus minimizing the likelihood of oily spots on the fabric.

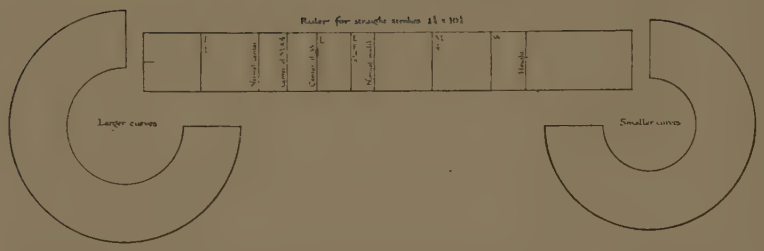
method. The stork design shows two interpretations of the same motif, one in one color and the other in two or more. In this case stencils for each color were cut from the original key stencil. In the stork design the bridges are somewhat more erratic than necessary to define the form. Such bridges in use would require bracing by means of threads. The floral design is much better in this respect. The design is one of rare beauty, formal in general arrangement, yet free in its minor details. How well the parts are massed around the center to produce a form that echoes the elliptical frame and thus bring the two into harmony! Notice also how the bridges in the elliptical frame have been introduced at the right place in every case to bring the dark spots in the frame into harmonious relations with the dark lines within. Ornament and inclosing form have been made one. When so great harmony as this has been produced in the form of a de-





LETTERING. Not only bookplates but many other objects of design require lettering. You ought to know your letters. Very few people do! You should know at least one respectable alphabet. For practical purposes a freely interpreted Roman alphabet is best as a sort of central standard. Such an alphabet is shown on page 356, drawn with the lead pencil, and drawn also with the pen, by Mr. James Hall. Notice first that the letters have certain proportions in themselves and in relation to each other. Notice that the strokes in the pencil alphabet are practically uniform in thickness. Notice the terminations of the strokes. These terminations are called cerifs. These elements, proportions, character of strokes, and cerifs, constitute style in lettering. In the pen alphabet the strokes vary slightly, the down strokes being slightly heavier than the side strokes. (Letters are to be thought of as having been drawn in the easiest and quickest way, without lifting the quill from the paper, — an M, up, down, up, down, with the cerifs added afterwards for finish.) In the pen alphabet the small or "lower-case" letters have been introduced. These must have the same characteristics as the large or capital letters, or "caps," as they are usually called.

Having mastered the forms of a single alphabet, the next problem is to get the letters into words and sentences so that the whole is legible. The plate on this page shows common errors. In line 1 the spacing is so bad the words are lost. Moreover, the letters are inconsistent. L has cerifs at two of the three terminal points, and the I is also furnished with cerifs. If some letters in a word are cerifed, all should be (except O, which has no terminals). Line 2 is better. In line 3 the axes of the letters are not uniform. Shape of axis is another element in style. Letters having a uniform slant are called "italic." The common form of letter and the italic should not occur in the same word. The I in this case has a dot over it (a common error in the work of a novice), which makes it a lower-case i, — out of place in a line of caps. Line 4 shows the S's wrong side up. In a good Roman alphabet the forms of the letters look to be in stable equilibrium. They never look top-heavy, like the first sketch in line 5. They are more like the three following



sketches in effect. All the elements seem to be balanced over a point slightly above the actual center of the letter. Look at a capital H, E, or S in the text of this book, first right side up and then wrong side up, and you will see what this means. In freely drawn alphabets the points of intersection are never exactly central. They are always above the center or below the center, and that with a certain uniformity. The haphazard arrangement of the points of attraction in line 6 is unpleasant enough. Line 7 shows all this variety reduced to a system. The crossings, the centers of attraction, are either at the upper point of trisection of the whole height or at the lower point. Line 8 shows first an ornamental initial, a device used to emphasize and enrich the starting-place for the eye. This line shows also how letters are massed in words, and how they are sometimes modified when they require to be condensed to fit a given space. But as this line stands there was no need of crowding the letters. There is room enough, and it is not occupied. These lines are easy to read, but unpleasant. The eye feels the gaps too strongly. The words do not fit the space allowed for the sentence. At 9 is shown a good way of laying out a page for lettering in capitals. Notice the margins: narrowest at the top, wider at the left, still wider at the right, widest at the bottom. Notice also that two units measure the space between each group of three spaces (four lines) for the letters. At 10 are shown some of the devices resorted to for bringing lines the right length.

On this page is a "block letter" alphabet, all the forms of which may be traced from the three templets shown at the top of the page. This device for making large-size letters for signs, mottoes, etc., is by Lawrence H. Bailey.

A B C D E F G H I
J K L M N O P Q
R S T U V W X
Letters based on squared paper may be Y Z used on posters or applied to linen

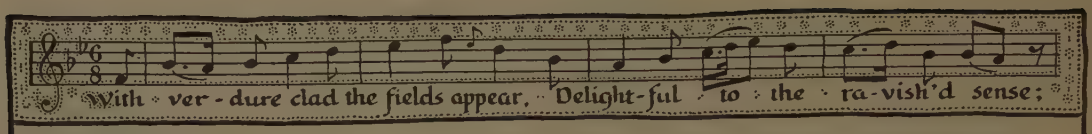
FREEHAND LETTERS FOR PENCIL WORK OR PEN

ABCDEFGHIJKLMNOP
QRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz&

1234567890 ARBOR-DAY 1917

CONSTRUCT · LETTERS TO FIT THE · GIVEN · SPACE ARBOR-DAY 1917

FINE FORMAL LETTERING. BY HARRY W. JACOBS, BUFFALO, N. Y.

APRIL

Excavations at Pompeii systematically begun by the State; 1784. These have revealed, besides hundreds of other works of art, some of the most exquisite metal work in the world.

1 FRI ◔ **Edwin A. Abbey b. 1852.**
Painter of the Sir Galahad pictures in the Boston Public Libry

2 SAT ◔ **William Holman Hunt b. 1827.**
Helped found the Pre-Raphaelite Brotherhood.

3 ✠ ◔ **John Burroughs b. 1837.**
Good citizen and husbandman. Friend and chronicler of bird and beast. Said: Knock at any door in the universe, the Eternal is there to answer.

The Sap

Strong as the sea, and silent as the grave
It ebbs and flows unseen.
Flooding the earth – a fragrant tidal wave,
With rust of deepening green. *John B Tabb*

4 MON ◔

5 TUE ◔ **Jules Dupré b. 1811.**
French landscape painter. Delighted in the play of clouds in the heavens ··· Light is the charm of his pictures. *Von Mach*

The raindrops' showery dance & rhythmic beat
With twinkling of innumerable feet. *Coles*

6 WED ●

7 THU ● **Gerard Dou b. 1613.**
Dutch genre painter. Master of detail.

Wordsworth b. 1770.
English poet who aimed "to give the charm of novelty to things of every day."

8 FRI ●

9 SAT ●

Has Nature in her calm majestic march
Faltered with age at last? does the bright sun
Grow dim in heaven? or, in their far blue arch
Sparkle the crowd of stars, when day is done,
Less brightly? When the dew-lipped Spring comes on,
Breathes she with airs less soft, or scents the sky
With flowers less fair than when her reign began?
Bryant

10 ✠ ●

11 MON ●

All at once I saw a crowd,
A host of golden daffodils;
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.

And oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon the inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils.
Wordsworth

Summer is coming,
is coming.
I know it, I know it,
I know it;
Light again, leaf
again, life again,
love again!
Tennyson

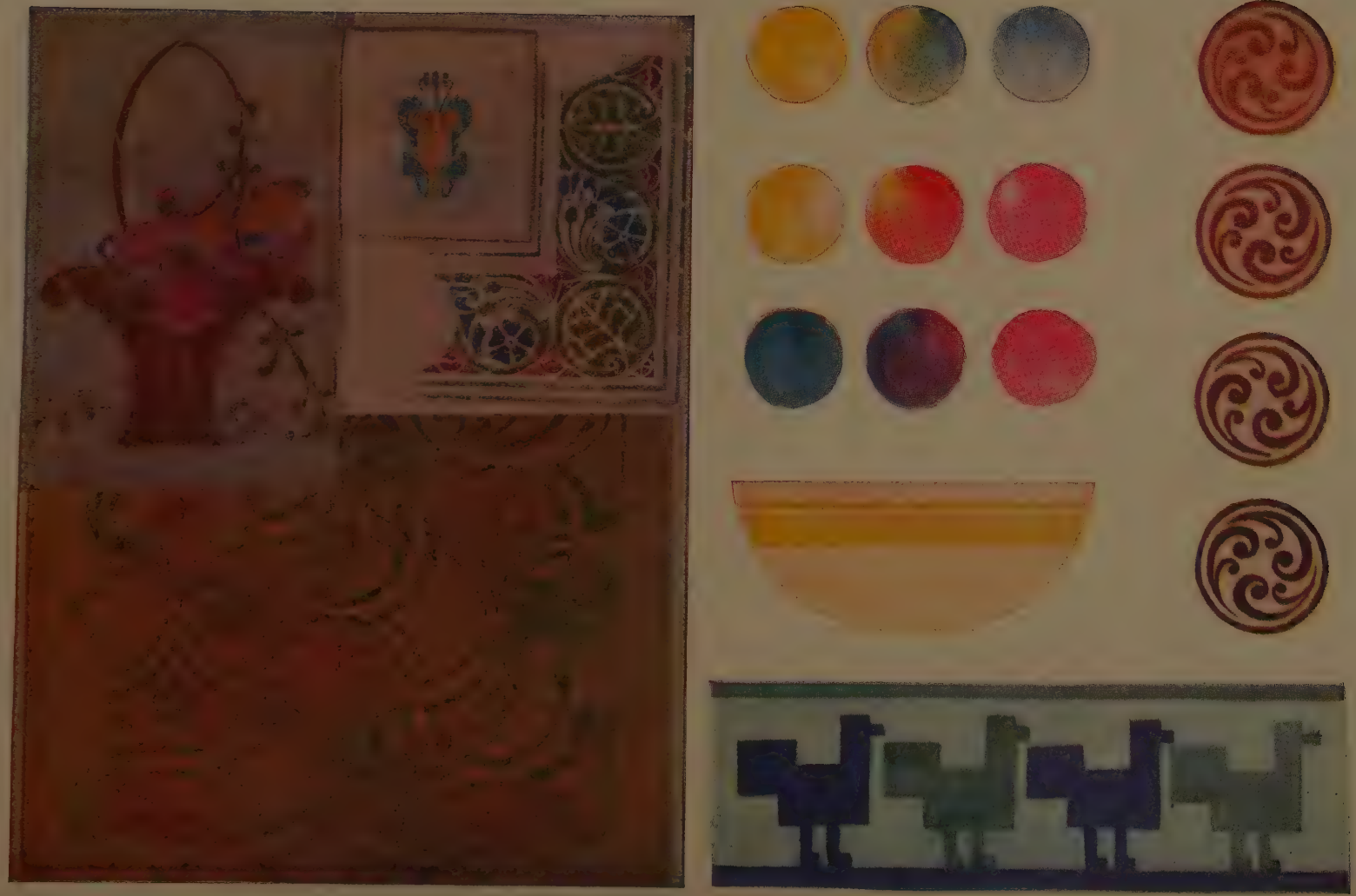
12 TUE ◔

13 WED ◔

14 THU ◔

Nature is a mutable cloud which is always and never the same. *Emerson*

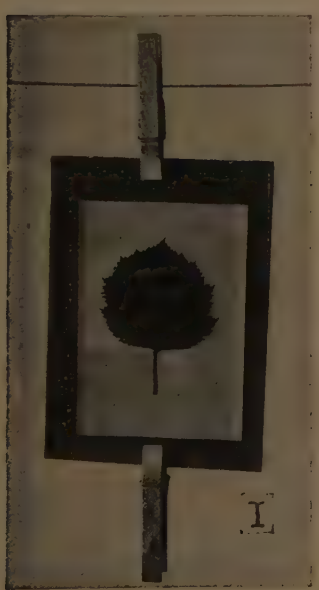
15 FRI ◔ **Théodore Rousseau b. 1812.** Of the Barbizon School.
He has left us the great trees of Fontainebleau ever green.

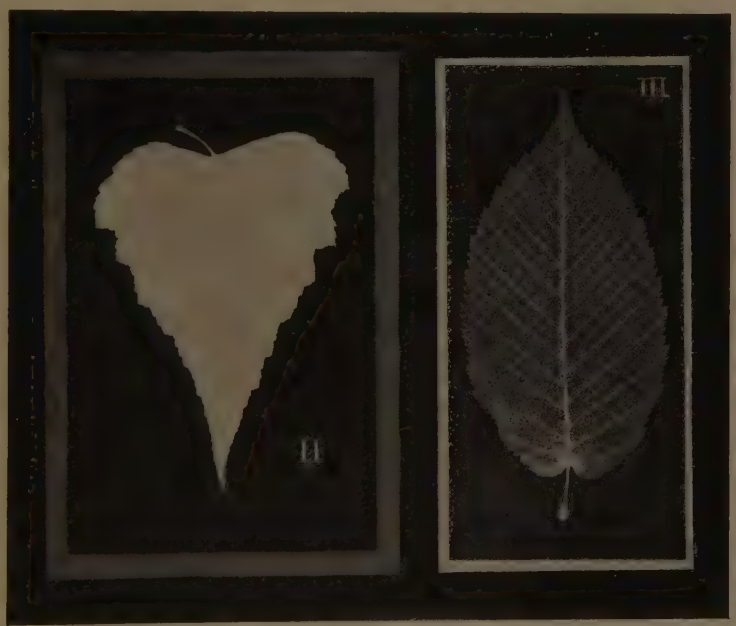


BLOWN STENCILING WITH WALDCRAFT DYES, AND OTHER EXAMPLES OF THE USE OF COLOR FOR DECORATIVE EFFECT. SEE PLATE AT PAGE 183

PHOTOGRAPHY

PHOTOGRAPHY has all the fascination of gambling. To get something for nothing seems to be an innate desire. To get a picture without the labor of drawing it, merely to press a button and let nature do the rest, — ah, that is like owning a magic lamp or a good-natured genie! Then, too, it must be admitted that photographs are valuable in many ways, not the least of which is as an educative factor in the life of the person who takes





them. Thousands of people have come to an appreciation of fine art through a cheap camera, just as thousands more have come to an appreciation of great music through a costly Victrola.

LEAF PRINTS. But one may begin in photography without great outlay. Buy some blueprint paper, or some Van Dyke paper, say 4 × 5 in size; get a piece of window glass and a piece of stiff cardboard, and two spring clothespins, as shown in Fig. 1. On your card put a piece of printing paper; on that a leaf; over that the glass; hold all together by means of the two clothespins. If you work very quickly all this may be done in a room where direct sunlight does not fall. The best results will be secured if the adjustment is made in a closet or darkened room, lighted, if at all, only by a red light. Expose the paper to direct sunlight for a few minutes, and then develop it in running water. The print should now be placed in a solution of the fixing salt (which the manufacturers sell with the paper), and then washed again, for fifteen minutes. The prints, when dry, may be mounted on cards. A collection of the leaves to be found in your own yard, or your own

village, would be educational and interesting; but, better than that, would be beautiful. Figs. 2, 3, and 4 show well-mounted prints made from leaves direct, as described. Of course, a regular printing frame would be better, for it would give more uniformly good results. The cards may be richer in effect if the print be mounted on a sheet of paper slightly lighter than the effect of the print as a whole, that paper trimmed to show about an eighth of an inch all around, and then mounted on a card somewhat darker than the print, as shown in Figs. 2 and 3. Not only leaves, but sprays, grasses, sedges, ferns, — in fact almost any natural object that can be pressed pretty nearly flat may be printed from in this way. Some feathers make extremely beautiful prints.

DESIGN PRINTS. Sketches, diagrams, bookplates, and designs of any kind may be printed from if drawn upon tracing paper; or, better, tracing cloth. The bookplates reproduced on the opposite page were made from drawings on tracing cloth by William S. Rice of California. The way to proceed is as follows: Make your design in pencil on ordinary drawing paper. When it is completely worked out in every detail, place over the drawing a sheet of transparent tracing paper or cloth. Tack it down smooth and securely by means of thumb tacks, one at each corner. Trace the design in solid black waterproof india ink, or, if you wish halftones to appear in the print, with some semi-transparent tone of water color or lead pencil. Mr. Rice used a lead pencil to secure his variety of flat tones. On the whole the prints will turn out more satisfactory when the whole drawing is interpreted in line, solid black and white, like the plate with the old apple tree against the clouds.

The prints need not be monochromatic. They can be dipped in dye, washed with water color, or hand colored in a great variety of tones, as you please. The smaller a thing is the more brilliant it may be. On the other hand, a thing to be seen always at short range should not display the brilliant expanses of color one expects to find in a poster to attract attention several rods away! As in any other piece of applied design, the thing should make its appeal to the eye first as a whole, a consistent whole in form, a consistent whole in color. Each should present a predominant color tone. As a rule, the warmer hues of color are more pleasing. A good color tone may be secured by dipping a black-and-white print in strong coffee.

PICTURE MAKING. The person who snaps his camera at what may happen to please his fancy is not likely to take many "pictures." A picture is not merely a view; it is something more. It is a composition. A pictorial composition aims to set forth beautifully a single object, or a single subject. Whatever else may

ORA · BORING
HER BOOK
ORA · BORING
HER BOOK
ORA · BORING
HER BOOK
LILY J. DALE
LILY J. DALE
JOHN DOE
HIS BOOK
JOHN DOE
HIS BOOK
My Book is my best friend

EX
LIBRIS
W.S.RICE
EX
LIBRIS
W.S.RICE

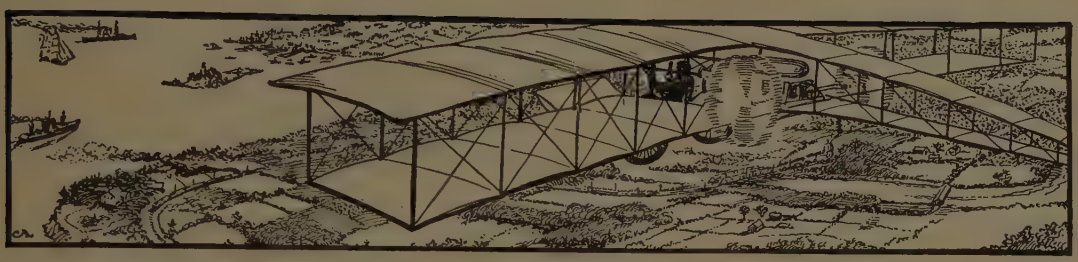
appear in the picture must help in some way to make the subject more attractive, more suggestive, more beautiful than it would otherwise be. Take, for example, the picture of the church tower opposite. The original view is somewhat obscured by the two L's of paper that have been used as a "finder" to discover the best possible picture of the tower the view contained. Think away the L's, and you will see that the tower had several rivals. The fine young tree at the right was taller, darker, more prominent in every way than the tower. Of course that would not do. A second rival was the electric-light pole, so tall and slim, almost as tall as the tower, and as attractive at the top as the tower itself. The heavy foliage hanging out of the sky and touching the light added to its distracting influence. Then, too, the sidewalk, leading the eye to the left and its paths running into unknown places, diverted the attention from the path leading to the tower. By limiting the picture to that part which appears inside the adjustable frame, all these rival elements are eliminated, and we have a picture in which one attraction is balanced over against another, so that the whole appears to be in stable equilibrium. But where the tower is the chief attraction, by means of the adjustable frame (the two L's of paper or thin card) it is always possible to find the pictures within the views. The other illustration, on the opposite page, contains at least four good pictures, each complete in itself, and beautifully composed; that is, with all the elements harmoniously interrelated, with reference to the center of interest, the subject. Three of these pictures have been isolated by means of the drawn rectangles. The subject of the first is "The Harbor"; of the second, "The Landing Place"; of the third, "The Fisherman's Home." The fourth, "The Old Fish Houses," has not been defined by a rectangle, but you can easily discover it by using the adjustable frame. Its central point is about where the vertical line passes between the first picture and the second. As the view stood the dark, meaningless shadow in the foreground constituted its greatest attraction for the eye, and the vast expanse of empty sky the next attraction. Between these two the real subject-matter had little show.

MOUNTED PICTURES. Having discovered the picture, the next step is to get it properly displayed. The print must be clipped to the size and shape of the picture. If the resulting picture is too small, a larger one may be "thrown-up" from the negative, by almost any photographic establishment. But small pictures are not to be despised when properly mounted. The illustration on this page shows how properly to mount a picture. It is a picture of a giant wild cherry tree. The size of the tree is suggested

A PHOTOGRAPH WITH TWO L'S OF PAPER, FORMING AN ADJUSTABLE FRAME, OF GREAT VALUE AS AN AID IN DISCOVERING WELL-COMPOSED PICTURES

A PHOTOGRAPH WITHIN WHICH, BY MEANS OF THE ADJUSTABLE FRAME, THREE GOOD PICTORIAL COMPOSITIONS HAVE BEEN DISCOVERED, EACH A COMPLETE PICTURE IN ITSELF

by introducing a figure as a sort of standard comparison, and by trimming the print so that the tree fills the whole area, but without seeming to be cramped for room. The picture is mounted on a card of gray, in harmony with the gray of the photograph. A photograph in gray should not have a colored mount, or an ornamental mount, for in either case the mount will be more attractive than the picture. Color is always more attractive to the eye than gray. The gray should have a hue (warm gray, cool gray, or green gray) in harmony with the hue of the print, but less intense. The tone of the mount should not be too dark nor too light. The rule is: darker than the lights of the picture and lighter than its dark. If the mount is white, all the picture will look gloomy. The white of the mount will be more attractive than the lights in the picture. If the mount is too dark, all the picture will look faded. The darks of the picture will not appear as accents. Occasionally a rather gloomy picture may be made to look lighter by the use of a dark mount. A picture that is too light in all its values may be made to look darker by the use of a white mount. A cold picture may be warmed in effect by selecting a cooler mount; and a warm picture cooled by selecting a warmer mount. The trying of a print on mounts of various hues and values will usually enable you to come at a satisfactory background for the print. The mount must help the picture to appear at its best. A pencil line, or a line drawn in ink with a ruling-pen, about an eighth of an inch away from the print, all around, will soften the transition for the eye from picture to mount, and enrich the effect without detracting from the force of the picture. This line may be in some dull color, upon occasion, to add a little snap to the effect. But in enriching the mount of a photograph by any device whatever you must remember that the mount or the frame of any picture must be less attractive than the picture itself. To secure a good picture from nature get a clear medium-size print, find the best possible composition within it, and have that part enlarged.



MODERN ELECTRICAL PROJECTS

SOME boys (and some girls) seem to be foreordained electricians. They love batteries and wires and signals from the start. If you are one of these, the working out of the two projects here given will be "as easy as rolling off a log."

THE TELEGRAPH SET

You will enjoy making it from start to finish, the operations are varied but simple, and you will value the instrument when it is completed. Making the instrument involves woodwork, metal work, and electrical work, and when it is completed it "goes," and gives a good, loud sound.

BASE. A nice piece of wood should be selected for an instrument of this kind, and it should be carefully planed and finished. Mahogany is usually too expensive, but gum wood is cheap and makes a very good base. For a good method of planing the base, see the note at the close of this description (page 370).

The bevel around the upper edge is marked off with a pencil, $\frac{1}{8}''$ in on the top, and the same measurement down on the edge. There is an advantage in planing the bevel on the ends first.

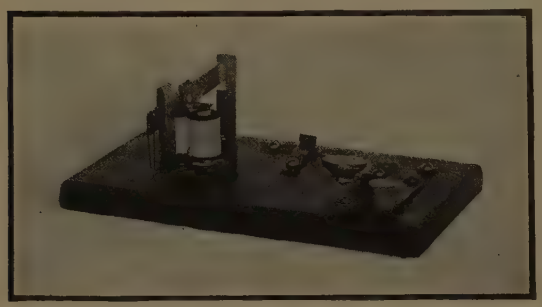
KEY. The telegraph set has two parts, the key and sounder. The key is operated to send a message, and the sounder receives it. With the key is a switch. Now for a little metal work. A strip of sheet iron No. 24 gauge (about the thickness used in making stovepipes), 12″ long and $\frac{1}{2}''$ wide, will supply all of the iron required for one set. A piece of this iron $\frac{1}{2}''$ wide, cut 4″ long, will make the key, another piece 3″ long will make the switch, and another piece $1\frac{1}{2}''$ long will make the contact piece for the switch. This leaves $3\frac{1}{2}''$ of the 12″ strip to be used on the sounder.

When the pieces for the key, switch, and contact piece are cut to length, the places for the holes are laid off on them and they are then punched. A nail-set and a piece of hardwood, with the end grain up, are satisfactory tools for punching. The drawing shows just where the holes are located. All of these holes may be punched just large enough to fit the No. 4 $\frac{1}{2}''$ round-head blue screws that will be used. The second hole on the key, and the hole on the contact piece, may afterward be enlarged to $\frac{3}{16}''$ diameter with a $\frac{3}{16}''$ drill bit in a brace, or a drill that may be at hand. For neatness the corners of each strip may be either snipped off or filed off $\frac{1}{16}''$ each way. It is well to mark these corners off with a sharp point before cutting them off.

The knob on the switch is a piece of $\frac{1}{2}''$ round wood $\frac{1}{2}''$ long. A piece of dowel is good for this. The knob on the key is made from round wood or dowel 1″ diameter and $\frac{3}{8}''$ long with the under side whittled to a concave, as the drawing shows. The switch and key knobs are fastened to the iron strips with No. 3 $\frac{3}{8}''$ screws. The key, switch, and contact piece each have bends, made with flat-nosed pliers. When these pieces are finished, they may be located on the base. A light center line is drawn for the key $2\frac{1}{4}''$ from the end of the base, and the two bolt holes and the screw hole located on it. The center line for the switch is $1\frac{1}{4}''$ in from the end, and one screw hole and one bolt hole are placed where the drawing indicates.

SOUNDER. How it works: The ticks of the sounder are made by the hammer striking the anvil. The magnet pulls or attracts the iron armature that is fastened to the hammer. This armature should be of soft iron (a $2\frac{1}{4}''$ piece of sheet iron $\frac{1}{2}''$ wide), so that when

the current of electricity goes through the magnet the armature is attracted downward, and as soon as the current stops the magnet lets go. The hammer cannot be iron or steel, as the magnetism would travel along it. One strip of brass $\frac{1}{16}''$ thick, $\frac{1}{2}''$ wide, and $4\frac{1}{2}''$ long will make an excellent hammer. A hole $\frac{1}{8}''$ in diameter is bored where the armature is fastened, and another $\frac{1}{8}''$ hole at the end of the hammer, where it is to be pivoted. The armature is fastened to the hammer by riveting. A piece of a nail will do



for a rivet. The anvil is a straight piece of brass $\frac{1}{16}'' \times \frac{1}{2}'' \times 3''$. A notch is filed on one edge $\frac{5}{8}''$ wide, $\frac{1}{4}''$ deep, beginning $\frac{1}{4}''$ from the top end. The lower end is bent at a right angle $\frac{3}{4}''$ from the end, making the base. Two holes for No. 4 $\frac{1}{2}''$ round-head blue screws are bored in the base end. The yoke carries the pivoted end of the hammer. It is made something like a letter A, out of the same $\frac{1}{16}'' \times \frac{1}{2}''$ brass strip. A piece $5\frac{1}{2}''$ long is doubled in the center, leaving a full $\frac{1}{16}''$ between each half, and then $\frac{1}{2}''$ is turned outward at each end for the base. One screw hole is put in each part of the base. A hole $\frac{1}{8}''$ in diameter is bored $\frac{1}{2}''$ from the top, or doubled end, where a piece of a nail, or a rivet, goes through to hold the hammer, and is riveted loosely.

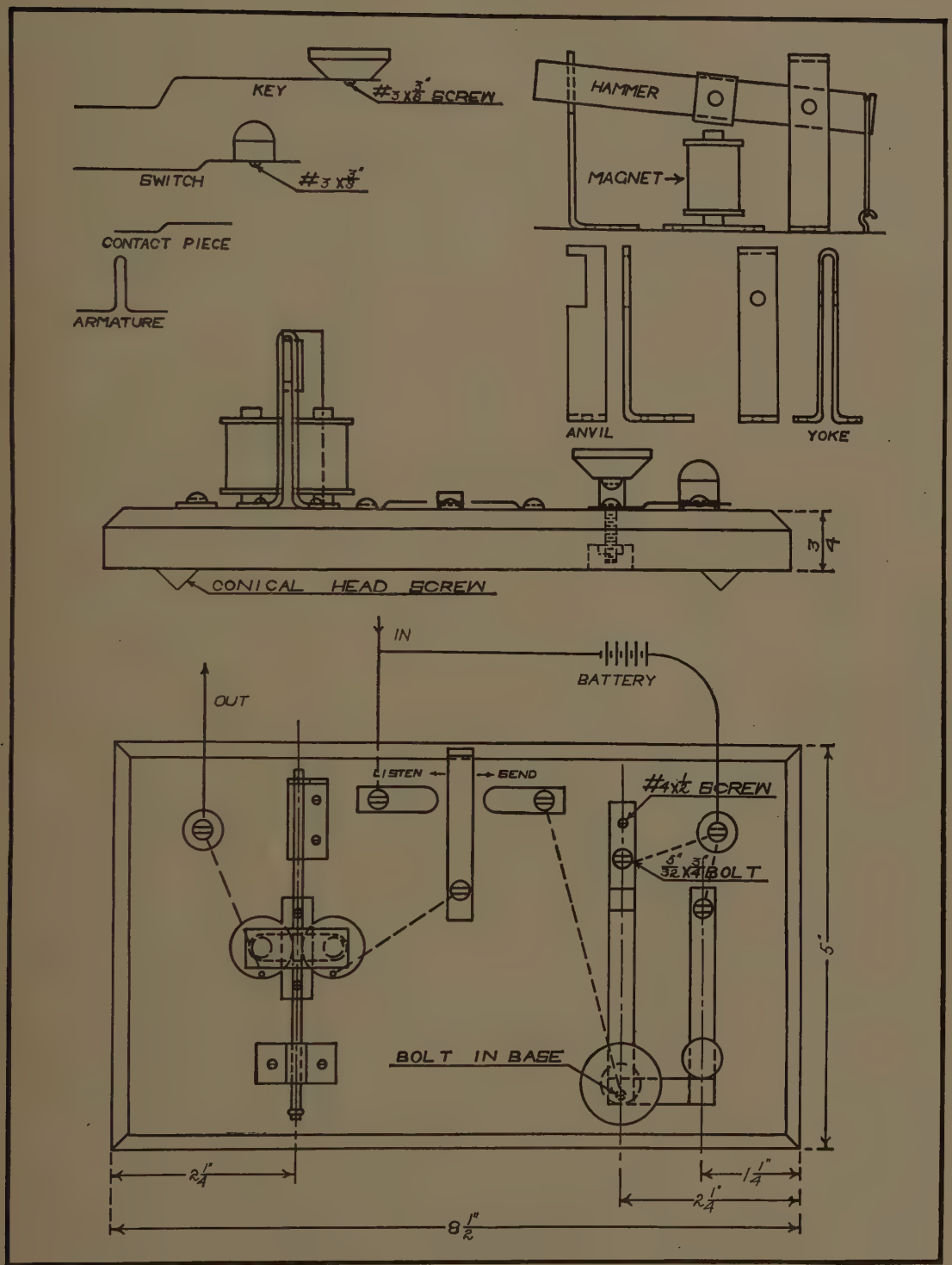
THE MAGNET may be secured by purchasing small cheap bell magnets from an electrical supply house at ten or twelve cents each, or they may be secured from a discarded electric bell, or they may be made by winding two stove bolts $\frac{3}{16}'' \times 1\frac{1}{4}''$ each with about twelve feet of No. 24 magnet wire. The lower ends of the bolts should be connected by a strip of sheet iron $\frac{1}{2}''$ wide, $1\frac{1}{2}''$ long, with a $\frac{3}{16}''$ hole at each end, that the threaded end of the bolt may pass through, and then the nuts put on.

The wire should be wound in the same direction on each bolt, and the two inner ends of the wires should be scraped naked and twisted together. In most cases it is preferable to purchase the small bell magnets.

All of the sounder is located on the base, on a center line, as was the key. It is convenient to mount the magnet first. A handy way to fasten it is to take a strip of sheet iron $1\frac{1}{4}''$ long with a screw hole at each end, slip it in over the connecting bar of the magnets, and fasten the strip with two No. 4 $\frac{1}{2}''$ screws, one in front of the magnet and one in back. The yoke, with the hammer connected, may then be placed, and last the anvil is screwed down.

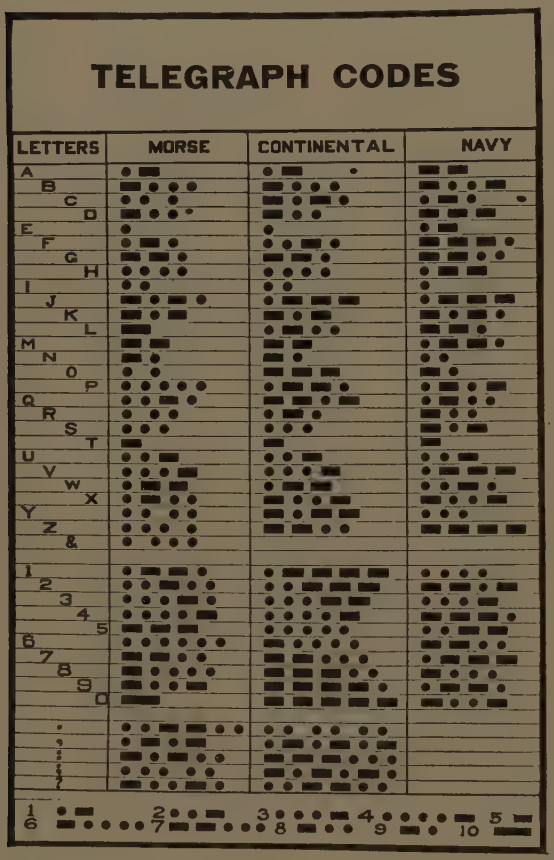
Two stove bolts are used for binding posts, and are placed near the corners at the back of the instrument, as indicated in the drawing. To understand the connecting of the wires on the under side of the base, trace out the path of the electricity, beginning with the right-hand binding post near the key. We will assume that the current comes in from the battery to this binding post, then along a wire to the key, along the key itself, when pressed down, down through the bolt under the handle of the key through a wire to the magnets, from the magnets to the left binding post. Also, when we are listening, the key is not pressed down but the circuit is "closed" by the switch. There is a short wire from the right-hand binding post to the bolt that holds the switch. The switch, when closed, is in contact with the short contact strip under the knob of the key. Now, then, when we are "sending," the switch is open and the current is interrupted by the pressing and rising of the key, so that the magnet in the sounder attracts the armature and lets it go each time the key is pressed down and rises. If we are listening, the switch is closed, the interrupted currents sent by the operator at the other end come in through the switch to the contact bolt under the key, then to the magnets, and on out to the other binding post.

The commercial telegraph systems are supplied by electricity either from dynamos or from "gravity" batteries. The amateur



DIAGRAMS FOR TELEGRAPH APPARATUS

generally uses dry cells, which operate satisfactorily in sending signals, but will run out in a short while if the current is left on continuously. The drawing shows a little cut-out switch arranged at the back of the instrument, between the key and the sounder. When the operator is using his own batteries in sending, he pushes his cut-out switch toward the key; but if he should want to listen without



using his batteries, he may leave his circuit closed by pushing the cut-out switch to the left or toward the sounder.

Most boys know that they can buy discarded cells at automobile garages. These batteries will last quite awhile for the telegraph work. In connecting them, they should be arranged, as the electrician calls it, "in series"; this means that the carbon of the first battery is connected to the zinc of the second, and the carbon of the second to the zinc of the third, and so on until the carbon of the last battery is connected to the binding post on the right of the instrument.

While we are making our instrument, we should be getting acquainted with the codes, which are given here. Telegraph operators generally use the Morse; wireless operators are apt to use either. The advantage of the Continental code is in the fact that it does not depend on spaces, but substitutes dots.

Boys living near each other may have considerable fun if each of them makes an instrument and connects his home with wires.

The following notes give the necessary details for completing the apparatus.

STEPS FOR PLANING. (1) Plane one broad surface smooth and true, mark one. (2) Plane one edge square to one, mark two. (3) Score a knife line close to one end, square to surfaces one and two, block plane end. (4) Measure length from finished end and repeat No. 3 on the second end. (5) Gauge width from No. 2 and plane to gauge line. (6) Gauge thickness from No. 1 all around on edges and ends, and plane the last surface down to this line.

THE HARDWARE needed for one telegraph set includes: seven No. 4 $\frac{1}{2}''$ round-head blue screws; eight $\frac{5}{32}'' \times \frac{3}{4}''$ round-head stove bolts; four conical head brass tacks; one small screw hook; two No. 3 $\frac{3}{8}''$ round-head blue screws; one piece of brass $\frac{1}{16}''$ thick, $\frac{1}{2}''$ wide, 10″ long; 1 piece of stovepipe iron (No. 24 will do) $\frac{1}{2}''$ wide, 12″ long; some bell wire. In boring the wood base for the bolts, bore through with a $\frac{3}{16}''$ bit, and then make a recess $\frac{5}{16}''$ deep for the nut on the under side with a $\frac{1}{2}''$ or $\frac{9}{16}''$ bit.

FINISH. After all of the parts have been assembled, and before wiring, it is well to take the parts off of the base and lightly clean the wood with a fine piece of sandpaper wrapped tightly around a block. Sandpaper *with* the grain, not across it. Be very careful not to round off the bevels. All the dust should be wiped off, and two coats of white shellac put on. When doing this, handle the brush lightly; don't press it down hard. Lay the coat on with a *few light* strokes. As soon as the shellac is dry, the parts may be put back, the wires put on the under side, and the conical tacks put on for feet.

THE WIRELESS TELEGRAPH STATION

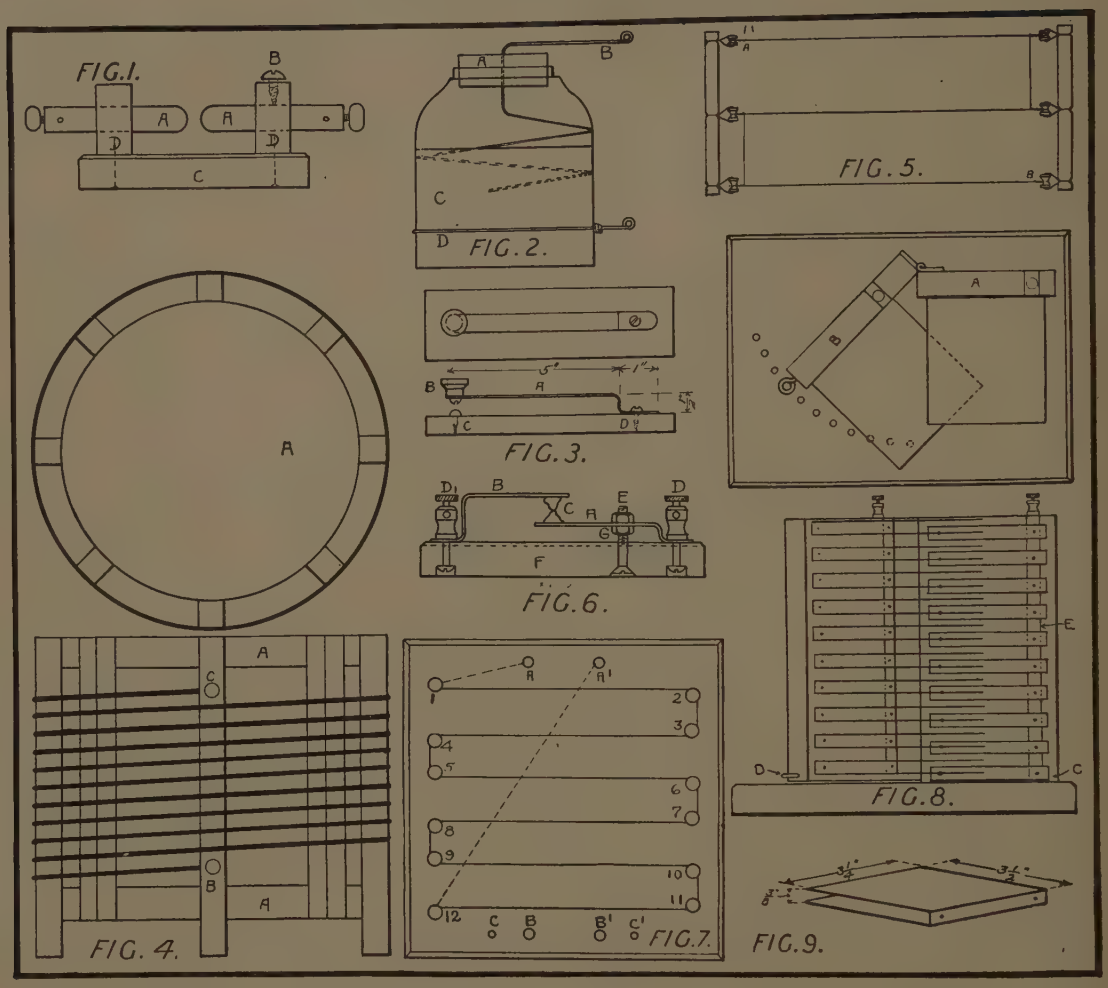
The station to be described is a small one, and in some localities can doubtless be operated without a license from the Federal government; but the amateur who builds it should write to the inspector in charge of his district, describing the station, before he attempts to do much sending. He may receive, however, without a license. Before starting construction read carefully all the directions for any given piece.

The apparatus commonly found in a wireless station consists of a spark coil, spark gap, key, fixed condenser or Leyden jar, sending coil, aërial, detector, receiver, variable condenser, tuning coil, and potentiometer. The amateur had much better buy the spark coil, of ½″ spark, from some dealer in wireless supplies, and also purchase the receiver.

THE SPARK COIL having been obtained, let us make the SPARK GAP for it. Get two old zinc rods from a used-up battery and break them off about 2″ long. File the end opposite the screw until it is round as at A, A, Fig. 1. Make a wood base, C, about 3″ × ½″ × 2″, and on it mount two uprights, D, D, 1″ high, to hold the zincs. Bore holes through and put a small brass screw, B, through one of them to hold one zinc at any place. Make this zinc to slide, but have the other tight. The uprights may be nailed on from the bottom. Now find a wide-mouth glass jar, such as a preserve jar, and clean it carefully. Line it on the inside and outside with tinfoil to within one inch of the top, as in Fig. 2, C. Make a wooden bung for the jar, A, and pass a stout copper wire, B, through it, coiling it so as to make a good contact with the inside coating and forming the outer end into a terminal. Tightly twist a second wire, D, around the outside coating near the bottom. This jar is known as a LEYDEN JAR or FIXED CONDENSER. THE KEY is for the purpose of controlling the current of the spark coil so as to make signals. To make a key, get a piece of spring brass 6½″ long and ¾″ wide and bend it into the shape shown in Fig. 3, and with the dimensions there shown. Drill screw holes near each end. Cut an empty thread spool in half, and, plugging the hole, screw it to one end of the brass strip for a handle, as at B, using a round-head brass screw. Make a wood base ½″ thick, 3″ wide, 7″ long. Make two small screw holes at C and D so as to take small brass screws. Screw on brass strip so that B is directly over C, touching it when the key is pressed down.

THE SENDING COIL is shown in Fig. 4. Cut out, or, if you have a lathe, turn out, two wood discs ⅞″ thick and 10″ diameter, as at A. Plane up four sticks ¾″ square and 8″ long and four more ¾″ square and 9″ long. With brass screws fasten these sticks to the discs as in the figure, alternating the long and short ones, so as to make four legs for the piece to stand on. On one of the longer sticks drill a hole for a binding post 2½″ up from the bottom, and a second hole 1½″ from the other end, as at B and C. Get some stout bare copper wire, about No. 8, and wind on ten turns, keeping the wire tight enough to keep from slipping, but also keeping the turns nicely rounded. Two pieces of flexible conductor (lamp cord will do) about a yard long can be used for connections by attaching to them small spring clips such as come on some makes of suspenders. These clips may be clipped on the wire at any place. THE AËRIAL must next be made. This is simply a wire held in an elevated position and connected to the spark coil. You will need to look around your back yard, or consider whether you can have the use of the roof of your house, before you decide how long to make the aërial wire. Get two pieces of wood about 24″ × 3″ × ⅞″. Cut notches in them as in Fig. 5. Tie porcelain knobs or glass bottle necks at these notches and string through them some stout copper wire, making the space between the two wood bars as long as your space will permit. Twist connecting wires across the first wires at the places shown in the figure and attach wires at A and B, twisting them into a single wire to lead into the house to your wireless station. The wires must not touch anything, if possible, till you get them into the house. Make a hole in the window glass, or put a porcelain tube through the wall of the house to carry the wire inside. The aërial may be set up on the roof by making two masts properly guyed. We have now completed the sending part of our station.

THE DETECTOR, Fig. 6, consists of some crystals held between brass clips. Various substances are used, such as carborundum, galena,



pericon, and silicon. As it will be interesting to try different ones, this holder has been made to take any of them. To make it, get some spring brass ½″ wide and 6″ long, rather stiff. Cut it into two pieces 3″ long and bend one into the shape shown at A and the other like B. The two pieces should be about ½″ apart when set on a flat surface. Drill a binding post hole in the end of each piece, and in A drill a second $\frac{3}{16}$″ hole for a stove bolt, about 1¼″ from the straight end, as at E. Make a small wood base, F, about 4″ long × 1″ wide × ½″ thick, and on it mount the two brass springs by means of the two binding posts. Directly below the $\frac{3}{16}$″ hole in A drill a hole for the stove bolt at E, making it a tight fit for the bolt. Insert the bolt from beneath the base and put on it a nut just below the spring. Screw the nut down and force the bolt through the spring and put a nut on the top of the bolt, so there will be a nut on each side of the spring. By means of these two nuts you can change the pressure on the crystals held between the brass springs. At C place your crystals. A good pair to try is this: from some dealer in wireless supplies buy a little zincite and chalcopyrite. Crack them into small pieces and test them against each other in the detector, while you are listening for signals when the station is ready for work.

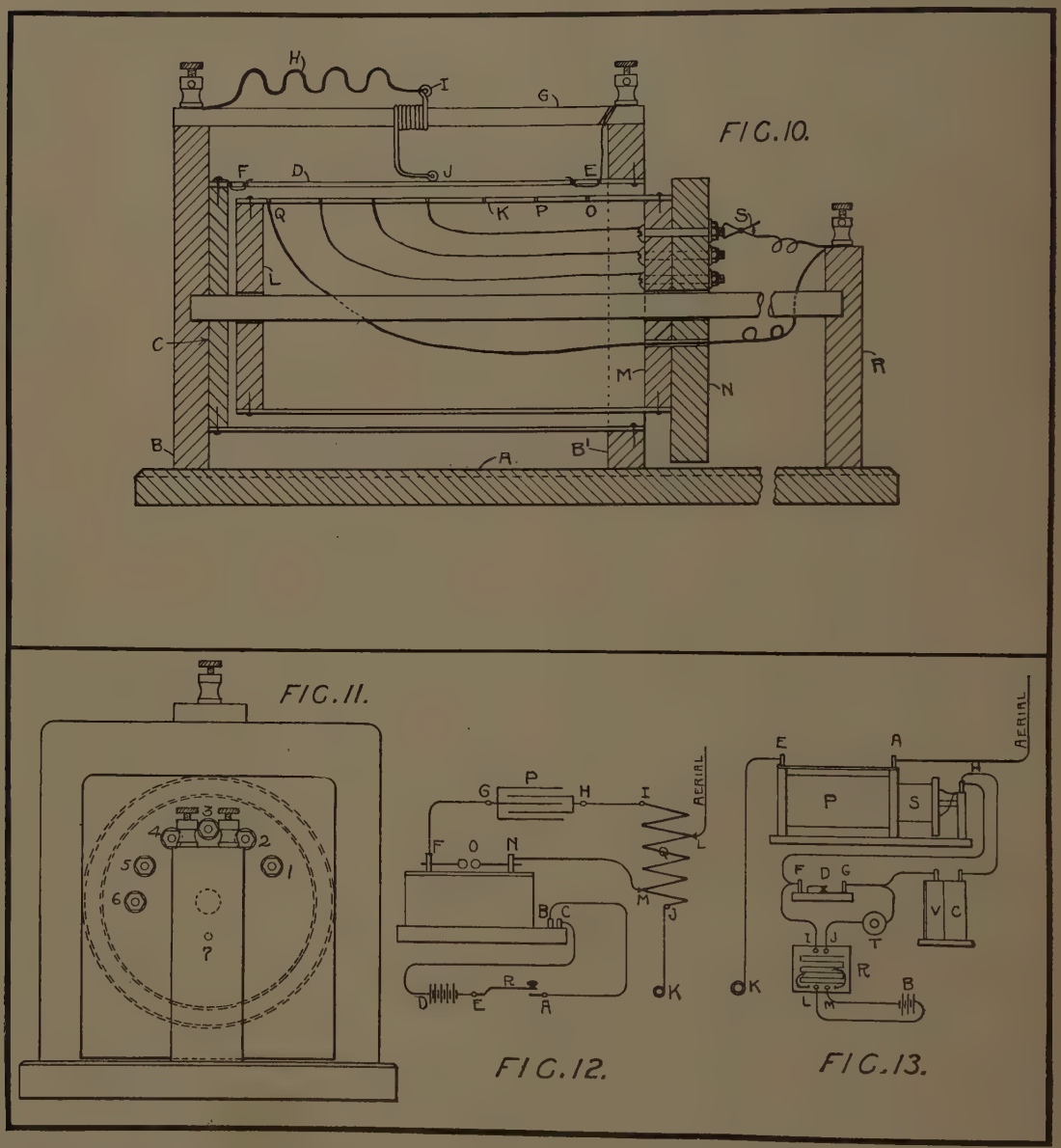
To change the working of the detector we need to provide a means of varying the current through it, and this can be done by making a simple piece of apparatus called a POTENTIOM-

ETER. This is shown in Fig. 7. Make a baseboard 9″ square and ⅞″ thick. Mount on it brass round-head screws about 1½″ long at the places marked 1 to 12 on the figure. Let the screws project about ¾″, and around them wind tightly a piece of bare German silver wire, about No. 30. Connect one end of this wire underneath the base to a binding post at A and the other to A′. On the other side of the apparatus mount two more binding posts and drill small holes near them, as at C, C′ near B, B′. Fasten pieces of lamp cord about a yard long down through the two holes and to the bottoms of the binding posts. To the loose ends of the lamp cords fasten spring clips as used on the sending coil. These clips are to enable you to connect to any part of the German silver wire.

To help in receiving long distances, the operator makes use of an instrument called a VARIABLE CONDENSER, shown in Fig. 8. Make a board 7½″ long, 4″ wide, and ¾″ thick, as at A, top view in the figure. Make a second board 7½″ × 4½″ × ¾″, as at B. Hinge these together by small brass hinges, as in the figure. Now cut twenty pieces of tin, rather stiff, each 3¼″ × 7⅜″, which we will call the "plates" of the condenser. Cut also two tin strips ½″ × 8″ for connectors, as at E. Bend each one of the large plates into the shape shown in Fig. 9, keeping the sides exactly ⅜″ apart and not getting any buckled places in the plates. Place each sheet saddle fashion over a piece of hardwood and punch two small tack holes in the sheet, as in the figure. Lay one of the ½″ strips, E, on A and flush with one end of it, as at C. Tack ten of the plates or "saddles" on the strip A, starting flush with the first one at C. By using a piece of ⅜″ hardwood for a driver you can tack them on easily. Space them exactly ⅜″ apart. In like manner, put a strip on B and tack over it the remaining ten saddles, arranging them to come just between those on A, when A and B are closed up to form a square corner. There should then be 1/16″ between metal everywhere. Be sure there are no places that come near touching. Bend over the ends of the strips and fasten them by two binding posts. Mount the whole on a base 9½″ × 7″ × ⅞″. Fasten only the piece A, with end C down. Cut off the bottom of B, so that B will just swing clear of the base, and fasten to it a small screw eye, D. By looking at the top view you will see a simple scheme for holding A in any position. When the plates are all sandwiched together, the condenser has its greatest effect.

To assist in receiving from a distant station, the operator will have need of a piece of apparatus called a TUNING COIL, shown in Fig. 10. Make a wood base of ½″ wood, 15″ × 5¼″, as at A, Fig. 10. Make two pieces 4¾″ square out of ½″ stock, as at B, B′, and draw a line across the middle of each. Measure 2¼″ in from one side on this line and make a dot. On B drill a ⅜″ hole halfway through at this dot. On B′ mark a circle 3½″ diameter and cut it out, saving the squared part to use. Turn or cut out two discs ¼″ thick and 3⅜″ diameter, with ⅜″ holes through them, at their centers. Glue one of them on B, as shown at C. On a round roller 3⅜″ diameter, roll up a paper tube with walls 1/16″ thick and 6″ long, as at D. Make a pair of small holes at E, 1″ from one end of the tube, and two more at F, ½″ from the other end. Mount the paper tube temporarily on something so you can revolve it, and wind on it one layer closely of No. 20 single cotton-covered copper wire, leaving a 6″ terminal at E and just enough to fasten at F. Slip this tube over C and tack it firmly in place with copper tacks. Now slip B′ over the tube and tack as before. Be sure the two wood squares stand firmly on a flat surface. Get a piece of ⅜″ dowel rod or other round rod and cut it 13½″ long, put glue on one end and drive it into C and B. Let the other end be supported with the center 2½″ above the base till all is set. Screw B and B′ neatly to the base from below and nail across their tops a strip of wood, G, ¼″ thick, 1″ wide, and 6½″ long. Fasten a binding post at each end, connecting one to E and the other to an 8″ piece of lamp cord, H. Wrap eight turns of stout bare copper wire around G at IJ to make a slider. Fasten the lamp cord at I and make J rub along the wire on the cylinder, sandpapering a path for it. Call this the primary winding of the tuning coil. To make the secondary winding for it, roll a paper tube, K, 6″ long with walls 1/16″ thick and outside diameter 3″. Make a wood disc, L, ⅜″ thick and 2⅞″ diameter, and another like it at M. Bore a 7/16″ hole through L in the

center and a hole in the center of M that will be a loose fit on the dowel rod. Now make a piece ½″ thick, 3 1/16″ long, and 3½″ wide, N. Dot it 1¾″ from one side and 1¾″ from one end. Pass six little bolts (stove bolts are good) through the six holes from the inside, as in Fig. 10. They should project about ⅛″ beyond the washers and nuts. Wind on the paper tube one



Bore a hole through it for a loose fit on the dowel. Fasten it to M with the holes in line. Referring to Fig. 11, lay out on M a circular row of holes, No. 1–6, each to be 3/16″ diameter. Bore hole No. 7 also for a piece of lamp cord to pass. close layer of No. 22 single cotton-covered copper wire, starting 1⅛″ from the right-hand end, by passing the wire through hole O for a 4″ terminal and then plugging the hole. Wind on closely till you have ¾″ wound on. Then pass

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AMATEUR WIRELESS OPERATORS AT WORK

Top: A home-made machine that sent 300 miles; tuning up his wireless. Bottom: Sending on his wireless; listening for the press.

the wire in a loop down through a hole, P, plug the hole, and continue winding. The loop should reach to the end of the tube, as at M. Continue winding and looping till you have five loops. End the winding ½″ from the left end of the tube and pass the end down through hole Q, then through hole No. 7, and leave 12″ extra. Plug hole Q. Fasten the disc M inside the tube with copper tacks and fasten the wire through O to bolt No. 1, first loop to No. 2, etc., then put in the disc L, and tack in place. Slip the completed coil over the dowel rod and into D, with hole No. 7 down. Make an upright, R, ½″ thick, 1″ wide, and 3″ high, bore a ⅜″ hole halfway through one side 2¼″ from the bottom, and then fasten the dowel rod into it with glue, making sure it stands upright on the base. Screw the upright to the base. Put two binding posts on the top of this upright, as in Fig. 11. Connect one post by a piece of lamp cord 8″ long with a spring clip, S, making a firm contact, and connect the other post with a piece of lamp cord twisted to the wire through hole No. 7. Push the excess wire and part of the cord back into this hole.

We are now ready to install our apparatus and connect up the station. First look at Figs. 12 and 13. In Fig. 12 connect with stout copper wire one end of the key, R, to a battery of five dry cells. To do this loosen the screw on the key and put the bare copper wire under it, screwing down again firmly, then connect the other screw of the key to B. Connect the remaining terminal of the battery to C on the primary of the spark coil. If you buy the spark coil, the primary posts, B, C, are those closest together, generally at one end of it. Pressing the key will now send current into the spark coil. Connect the two other posts, F, N, of the spark coil, one each to the two sides of the zinc spark gap, O, and set the gap at ⅛″. The key should now send sparks across the gap when pressed down. Connect also one side of the spark gap to one side, G, of the Leyden jar, P. Connect the other terminal, H, of the jar to post I on the sending coil. Now connect the other post of the sending coil to a water pipe for a "ground," as it is called. Do this by filing a bright place on the pipe and winding several turns tightly around it, as at K. Connect N to a clip to be placed on M, and connect your wire from the aërial by means of a clip to the sending coil at L. The receiving set, Fig. 13, has the aërial connected to one post of the primary of the tuning coil at A. The other post of the tuning coil, E, is to be connected to a water pipe, K. Connect one post of the secondary to one side of the detector at F, and connect the other side of D to a high-resistance receiver, T, which you were advised to buy. The terminal G is connected also to one side of the variable condenser, VC. The other side of the condenser, VC, goes to the second post on the tuning coil at H. Fasten a wire also from the side of the detector at F to I on the potentiometer, R. Connect J to the remaining side of the receiver, T. Attach a battery of three dry cells to L and M of the potentiometer, R, and snap on the two spring clips at any two places on the German silver wire. You must arrange to disconnect the aërial from the sending set when you are listening, and *vice versa*. This can be done by a double-throw switch, or by simply removing the wire on the binding post, A. To listen, connect aërial to the tuning coil as shown, place the receiver at your ear, then slowly slide in the tuning coil secondary, or run the slider along the primary, or try changing the pressure on the crystals in the detector, till you catch the distant signals. They may sound like a faint high-pitch note. By experimenting with your apparatus, you will find the best adjustment.

The descriptions of apparatus for these telegraph and wireless sets are technical, but the machinery is not too complicated for you to study out and make. Mr. Hall, who writes the directions for the wireless apparatus, is a teacher of high school boys. He says that he has acted as "consulting engineer" more than once to boys who were setting up wireless stations. The telegraph set is described by Mr. MacNary, principal of the Vocational School, Springfield, Massachusetts.

To make and use this apparatus with any satisfaction, you must have not only mechanical skill but a knowledge of the principles of electricity. Read the chapter on "Electricity" in Volume II, where the story of these two inventions is told, but do not be content with this. Read everything you see on the subject, and learn all you can about this mysterious force which you are making your servant to enable you to talk across space.

THESE BUT IMPERFECTLY REPRESENT THE REAL AND DELIGHTFUL PICTURES IN THREE DIMENSIONS THAT HOMEMAKERS LIKE TO PRODUCE

HOUSEHOLD ARTS

COOKING FOR LITTLE GIRLS

ALMOST all little girls have sometime known the joy of keeping house on a wide, mossy ledge, with bits of blue and white china arranged in shining rows along the cracks which make the shelves; and wonderful mud pies, frosted with yarrow blossoms, stored away in safe corners of the stone pantry. Another pleasure, too, is in shaping thimble cookies and doll biscuit out of the dough which Mother or Norah has made and in baking these beside the big ones on the tin sheet. Best of all, at last comes the day for making something real, something which is truly a part of the family meal, or even, after a good deal of practice, the preparation of the whole meal itself.

Before a little girl starts to cook anything, she should be ready with a large convenient apron, to protect her dress from spots and flour. A white apron is best because it can be washed as often as may be necessary and yet it will not fade. It does not really soil any more quickly than a pink or blue one and it always looks fresh and dainty. It must not be very close fitting or it will be too warm. If the little girl wears short sleeves, she will need no sleeves in her apron, but if her arms are covered to the wrist she must have a sleeved apron or separate sleeves to slide on and protect her cuffs. Besides the apron, she should have a round holder, not too stiff, and a plain, hemmed dish towel. These may both be buttoned to the apron. The towel must never be used for a holder, while if the holder is not at hand, burned fingers may be the result. A cap may be worn, or the hair may be put back very straight and smooth while the cooking goes on. Of course, every little girl knows that her hands and finger nails must be entirely clean and dainty.

After she is personally ready for her work, she begins to make the acquaintance of her tools. She may not be introduced, as "Alice in Wonderland" met the "Pudding," but she must become familiar with such necessary utensils as measuring cups and spoons, quart measures, double boilers, saucepans, and many other useful utensils. She needs at least one real measuring cup which is made to hold just one quarter of a quart. This cup should be marked into thirds and quarters, to help the little cook in measuring for her dishes. Recipes are made to be prepared by measuring cups and spoons, and it would be just as unwise and harmful to buy ribbon or lace by "guessing at" the yard length or measuring with an umbrella or stray stick instead of a yardstick, as it is to "guess at" amounts of sugar, flour or milk, or to measure these in cups of uncertain size. Before the little cook begins to measure, here are some rules for her to remember, as well as a table of the measures commonly used in cooking:

TABLE OF MEASURES

1 saltspoon	=	¼ teaspoon
3 teaspoons	=	1 tablespoon
16 tablespoons	=	1 cup
2 cups	=	1 pint
2 pints	=	1 quart

GENERAL RULES FOR MEASURING

1. Fill the cup or spoon lightly, to the brim, then push off the extra material with a knife, having the edge of the knife against the top of the cup or the sides of the bowl of the spoon.

2. Never shake anything down in measuring it, as this gives too large a quantity. Do not in any way pack material into a cup.

3. Be dainty and careful not to spill as you measure. This helps to keep from wasting

material and also makes less trouble, besides keeping your worktable in neat order.

4. The teaspoonful and tablespoonful are always measured level.

5. Divide the spoonful into halves by making

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BOYS LIKE COOKING TOO

a straight mark from the handle to the point of the bowl and pushing out the material on one side. Cut this in half to measure a quarter.

"FIRST THINGS FIRST"

BOILING WATER

AFTER you have put on your dainty apron and examined your tools and tried a little measuring, you will wish to "cook" something. Cooking means the preparation of food by means of heat, so some day you must learn how to build and manage a fire in the range, or to use the gas or electric stove. Just at first, we will suppose the fire is ready. Many things are cooked by receiving heat through boiling water, so you must know how to distinguish the appearance of water that is really boiling. Fill a saucepan about half full of cold water and put it on to heat, then notice the things that happen in it. Bubbles form on the bottom and sides of the saucepan, growing gradually larger and running together to form larger bubbles. These gradually leave the sides of the saucepan and dance about in the water. After a while they come to the surface, and at last one comes and breaks there, sending out a puff of steam. Then we say the water is beginning to boil. If we let the water boil for some time it will all disappear, going away into the air in the form of steam, leaving the saucepan dry. If the water evaporates too much while you are cooking something in it, your saucepan will be spoiled and your food will burn in it. If you watch some cocoa shells as they are cooking in the boiling water you may see how the currents of heat carry them from the bottom to the top.

COCOA SHELLS

½ cup of cocoa shells 3 cups of water

Let the shells boil in the water for an hour, adding more water as the first boils away, to keep the original quantity. Strain out the shells and serve the shells with sugar and scalded milk.

SCALDING MILK

You will constantly need to use scalded milk, and there is but one way to prepare it, though you may use many kinds of utensils. Scalded milk is cooked over hot or boiling water and not over the direct heat. You must have, then, some sort of a double boiler, so that there is a chance for water in the lower pan and for the milk in the upper one. It is not necessary to have a double boiler from the store, for two saucepans of different size, a pail and a saucepan or any other good combination, will do as well. While the milk is heating, watch it, and notice

the "wrinkled skin" as it forms over the top. This is the sign that the milk is scalded.

REASONS FOR BOILING WATER

1. To cook other things in it.
2. To make it more wholesome and pure in case it contains any harmful dust plants.
3. To soften it if it is hard.

REASONS FOR SCALDING MILK

1. To cook other things in it.
2. To make it more wholesome by killing any harmful dust plants that might be in it.
3. To make it keep sweet longer.

SOME DISHES TO MAKE WITH POTATOES

POTATOES are nowadays so common and usually so cheap that it seems strange to remember that they were unknown to civilized people until English colonists found them in Virginia and carried some back to England. They are enlarged portions of underground stem, and not roots, as carrots and turnips are. Potatoes may be cooked with or without their jackets, according to the use you wish to make of them and the age of the potato. If they are pared, remove a thin paring only, because the best part of the potato lies directly under the skin.

BAKED POTATOES

Choose medium-sized potatoes and wash them thoroughly. Lay them in a pan on the rack in a fairly hot oven and let them cook until they are soft all over. If you turn them occasionally they will bake more evenly. Bake about thirty-five minutes. Serve hot, in a napkin.

BOILED POTATOES

Choose medium-sized potatoes and scrub them. Pare them, unless they are very new. After they are pared put them at once into freshly boiling, salted water, enough to cover them. (Use one tablespoonful of salt to one quart of water, for six potatoes.) Let them boil until they are tender when tried with a fork. (About twenty-five minutes.) Drain off every drop of water and let them stand, uncovered, in a warm place to drive off the steam. Serve hot with meat or fish gravy. Or make them into

RICED POTATO

Press hot boiled potato through a potato ricer or coarse strainer. Pile lightly on a dish and serve very hot. Make this into

MASHED POTATO

Measure the hot riced potato, and for every cup of potato add one tablespoonful of butter, one-fourth teaspoonful of salt, and a very little pepper. Put these with the potato in a sauce-

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A FIRST LESSON

pan and add enough hot milk to make it light and creamy but not too moist. About one and one half tablespoonfuls for one cup is usually

enough. Beat the whole with a fork, while you reheat it. It should be light and white when it is done. Pile lightly on a hot dish and serve hot.

CREAMED POTATO

2 cups of boiled potatoes, cut into dice (small cubes)
½ teaspoonful of salt
A very little pepper
⅓ cup of milk
1 teaspoonful of chopped onion, if you like

Cut the potatoes into dice and add to them the salt and pepper. Cook the onion in the milk until the onion begins to be tender. Add the potato and cook until the milk is mostly taken up. Stir in the butter and serve hot. It may be trimmed with parsley which has been thoroughly washed and dried.

FRIED POTATO

2 cups boiled potatoes, cut into dice
½ teaspoonful of salt
A little pepper
1 tablespoonful of butter or beef dripping
1 tablespoonful of chopped onion

Cut the potatoes into dice and sprinkle them with the salt and pepper. Cook the onion in the fat (butter or dripping) until it is a light brown; then add the potatoes and cook until they have taken up the fat and are brown. Serve hot, garnished with parsley.

EGGS

EGGS are so useful and so nourishing, yet sometimes so expensive, that you must learn to cook them very carefully to obtain the best results. Nothing should be wasted, but it is worse to be careless with gold pieces than with pennies, and eggs and butter stand for gold pieces among our common food materials.

Eggs contain a substance which cooks with very little heat and becomes tough and indigestible when cooked too long or at too high a temperature. To see this substance you may prepare a dropped egg. This would be a good dish, if you learned to make it well, to arrange for Mother when she had a headache and you prepared her luncheon or breakfast.

DROPPED EGG

Wash the egg carefully and break it into a cup, taking great pains not to break the yolk. Butter a smooth, clean frying-pan and put into it one cup of water and one-fourth teaspoon of salt. (If you have a buttered muffin ring in the water, to hold the egg in a round shape, it will be easier.) Let the water just come to the boiling point, then gently pour the egg into the muffin ring and at once lower the heat to keep the water just below boiling. Pour the water over the egg, to form a little veil of cooked white of egg over the surface of the yolk. (Notice how the white of eggs turns white and jellylike as it cooks, and notice also that it cooks while the water is not boiling.) When the egg is firm and jellylike, but not tough, remove it from the water with a skimmer and place it on a piece of buttered toast. Serve hot.

You will understand why we do not really *boil* eggs when we cook them in their shells. They cook more evenly and with less danger of being tough, if they are cooked just below the boiling point. Of course the egg must be cooked a longer time than would be necessary if it were boiled.

EGG COOKED IN WATER

"SOFT-BOILED"

Put the egg into water just below the boiling point and let it stay six or eight minutes. Be sure that there is water enough to cover the egg all over. Notice the little bubbles on the surface of the egg and on the bottom and sides of the saucepan and remember that these show that the water is very near to boiling, but that so long as they do not go to the surface and break there, actual boiling is not taking place.

"HARD-BOILED"

Cook the egg as in the last recipe, but let it remain in the water thirty minutes. At the end of this time the white should be firm but not tough and the yolk dry and powdery.

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TWO COOKING CLASSES IN GRADE SCHOOLS

Above, the girls are working with gas stoves; below, they are preparing materials for the lesson.

These eggs are suitable for picnic lunches and for garnishing of all sorts.

SOFT CUSTARD

1 whole egg or the yolks of 2
2 tablespoonfuls of sugar
Speck of salt
1 cup of milk
¼ teaspoonful of vanilla

Scald the milk. Beat the egg slightly, with a fork. Add to it the sugar and salt. Pour the scalded milk over the egg, etc., and put the mixture back into the double boiler. Let it cook with constant stirring, until it is thickened and creamy. (Do not let the water boil under it.) Remove from the boiler, strain, and add the vanilla. If it curdles, beat it with an egg-beater until the lumps break up and it is smooth. But with care about the heat it will not curdle. The yolks of eggs make a smoother custard than the whole egg. Make a frosting by beating the white very stiff and dry and adding to it one tablespoonful of powdered sugar for each white of egg. Put this on the custard after it is cool and you have Floating Island.

CREAMY EGG

2 eggs
½ teaspoonful of salt
Speck of pepper
½ cup of milk
2 teaspoonfuls of butter
2 slices of toast

Scald the milk. Beat the eggs slightly with a fork and add to them the salt and pepper. Pour over them the scalded milk and return the whole to the double boiler. Cook as in the recipe for Soft Custard. Add the butter after the egg is removed from the heat and beat it in thoroughly. Serve hot on the toast.

OMELET

1 egg
¼ teaspoonful of salt
Speck of pepper
1 tablespoonful of milk
1 teaspoonful of butter

Separate the white and yolk of the egg and beat the white very stiff and dry and the yolk until it is light colored and creamy. Add the salt and pepper to the yolk. Melt the butter in a smooth frying-pan, and when it is bubbling, but not brown, add the milk to the yolk of the egg and cut into it the stiff white. Pour it at once into the buttered pan and cook gently, lifting it now and then at the sides. When it is golden brown turn it in the pan, or put it into the oven to cook the top. Make a gash on opposite sides, fold together, and turn the omelet out on a hot platter. The omelet must not cook too fast nor too long, or it will burn or be tough.

THE CARE OF EGGS

When eggs are brought into the house they should be washed carefully and wiped dry. The shells, when broken, may then be saved to use in clearing coffee. Eggs should be kept in a cool, dry place.

TEST FOR THE FRESHNESS OF EGGS

If an egg is placed in water enough to cover it entirely you can see how fresh it is by noticing the position it takes. If it lies quietly on its side, on the bottom of the pan, like a stone, it is very fresh. If it stands up on the pointed end, but without floating, it is still in good condition. If, however, it floats in the water it is to be regarded with doubt and is probably not good for use.

HOW TO MAKE WHITE SAUCE

WHITE Sauce is one of the most useful things to understand, because if you know how to make it well you can use it in a great many ways, by flavoring or seasoning it differently. It may be prepared as a sauce for vegetables, toast, fish, or egg, or by using meat stock in place of the milk it may be made into gravy. If it is sweetened and flavored with vanilla or fruit juice it becomes pudding sauce. "Cream soups" are made like white sauce, only that they are thinner and are flavored with the vegetable which gives each its name.

WHITE SAUCE

2 tablespoonfuls of butter
2 tablespoonfuls of flour
Speck of pepper
1 cup of milk
¼ teaspoonful of salt

There are two methods of mixing this sauce. The first is easier for a beginner, but the sauce is not so digestible.

Method 1. Scald the milk. Melt the butter, but do not let it brown at all. (It needs very little heat to melt butter.) Mix together the flour, salt and pepper, and stir them into the melted butter until a smooth paste is formed. Add the milk to the paste of butter and flour, adding one-third of it at a time and letting the sauce boil and thicken each time before adding more milk. Stir it constantly. Cook until it is thick and free from the taste of raw flour. Strain and serve with vegetables or on toast, if the pepper is left out.

Method 2. Scald the milk, all but two tablespoonfuls. Mix these with the flour, salt and pepper until a smooth paste is formed, then go on adding the milk as in Method 1. When the sauce is free from all floury taste, stir in the butter, remove from the heat, strain, and serve.

"EGG GOLDENROD"

1 cup of white sauce
2 or 3 hard-cooked eggs
6 slices of toast
Parsley

Prepare the white sauce and cook the eggs hard, as you have already learned to do. Remove the shell and skin carefully and separate the white and yolk. Chop the white into small pieces and stir it into the white sauce. Pour this over the toast. Press the yolk through a coarse strainer, with a wooden spoon, and sprinkle this yellow powder over the white sauce on the toast. Trim the dish daintily with sprigs of clean dry parsley, if you have it.

HOW TO USE PARSLEY

1. Wash the parsley carefully and dry it gently with a clean cloth.

2. Use only good parsley and not too much. Stick the stems down, so that only the leaves show as the dish is served.

BISCUIT

SOMETIMES you wish some kind of bread very quickly, and yeast bread takes a long time to prepare, but baking-powder biscuits are easily made in a very short time. In some ways, too, they are more wholesome than yeast bread.

BAKING-POWDER BISCUIT

1½ cups of flour
2 teaspoonfuls of baking powder
½ teaspoonful of salt
1½ tablespoonfuls of butter
⅔ cup of milk or milk and water

1. Sift together the dry ingredients.

2. Cut in the butter with a knife.

3. When the butter is so small that you cannot see it, cut in the liquid until a smooth dough is formed.

4. Place the dough on a floured board and roll, very lightly, until it is about three-fourths of an inch thick. Cut out with a biscuit cutter and bake on a buttered tin or tin sheet in a hot oven, for twelve or fifteen minutes.

SHORTCAKE, INDIVIDUAL

1½ cups of flour
2 teaspoonfuls of baking powder
½ teaspoonful of salt
3 tablespoonfuls of butter
⅔ cup of milk
2 teaspoonfuls of sugar

Mix like the biscuit, adding the sugar with the salt and flour. After the dough is cut out, lay the little circles in pairs, buttering the lower ones a little, then bake. After they are done, they will split easily where they were buttered; then fill them with crushed and sweetened fruit, which may be put in the middle and also on top. Stewed dried apricots make a delicious filling for the shortcakes when there are no fresh fruits.

Caution

1. Do not handle the dough at all with the fingers, as that makes it tough.

2. Use as little flour as possible, and make the dough as soft as you can.

SOME SIMPLE CANDY

HOME-MADE candy is better than much candy that you buy, because you know that it is made of good materials. It also costs less, and is simpler and less indigestible. The proper time to eat candy is after dinner or some

hearty meal, when you are not hungry and are not likely to eat more than is good for you.

Sugar, when it is cooked either by itself or in boiling water, is extremely hot, so you must be very careful not to burn your fingers in stirring it. The first candy you can make by heating the sugar all by itself.

PEANUT BRITTLE

1 cup of sugar — ¾ cup of chopped nuts

Put the sugar into a smooth, clean frying-pan and let it melt until it is a light golden brown sirup. Stir it constantly while it is melting. When there are no grains of sugar left, stir in the chopped nuts and pour the candy at once on a tin sheet. Score it while it is cooling, so that after it is cold it will break into square pieces. Scoring candy means marking it deeply on the surface, without trying to cut it through. You must often *begin* to score when the candy will not hold the mark permanently, or else you cannot score it at all at the end. If the mark disappears, go over it again as you did at first.

MOLASSES PUFF

1 cup of molasses — ¼ teaspoonful of soda

Butter a saucepan and cook the molasses in it until, when a little of it is dropped into cold water, it is perfectly brittle. Stir in the soda, remove from the heat, and pour it out on a buttered tin. Score, while cooling.

WHITE OF EGG CREAM CANDY

1 white of egg — 1 tablespoonful of water
Flavoring — Nuts, dates, etc.
Powdered sugar

Mix the white of egg, water, and flavoring, but do not beat them. Add powdered sugar enough to make a firm paste which can be handled. Make this into balls and lay a half nut on each side of each ball. Roll in granulated sugar. Or you may stuff washed, stoned dates, or candied cherries with the paste. The flavoring may be vanilla, lemon, or almond, as you like. You may also stir a little powdered cocoa into the sugar, until you have the color and flavor you like. With this foundation you may make many simple but attractive kinds of candy, by using your ingenuity, in varying the flavor and the fruit or nut which you use with it.

If you have not time to make this candy, you will find that dates stuffed with peanuts or with English walnut meats or halves of almonds are delicious. Put in the nuts, press the dates back into shape, roll in powdered sugar, and serve as a confection.

FUDGE

2 cups of sugar — ¾ cup of milk
1 tablespoonful of butter — 2 squares of chocolate
¼ teaspoonful of vanilla

Melt chocolate in the saucepan, add sugar and milk. Cook until it strings from the spoon or if dropped in water forms a soft ball. Add butter and vanilla. Remove and beat five minutes. Much of the success of candy-making depends on beating. As you gain experience, you will be able to tell by the feeling and appearance just when to take it off to prevent its being either too soft to cut or too sugary. A tablespoonful of shredded cocoanut sifted in after fudge is removed from the stove takes from the extreme sweetness.

COOKING FOR OLDER GIRLS

OF all the arts that a girl can learn, cooking is the most useful and rewarding. Everyone must eat, and the person who can meet this need with appetizing, skillfully prepared dishes wins praise from every side. But cooking must be learned with patient trials and much experimenting. As little girls we do the simplest things, getting our experience of handling food and dishes; as older girls we learn more about the processes and principles of cooking, for if we understand how to do a few standard things well, we shall find we have the key that unlocks to us all the mysteries of our mothers' cookbooks.

Try these simple recipes until you can bring them to perfection. You will find you have become mistress of a womanly art that will be

a source of delight and a means to independence all your life. No woman is so helpless as the one who cannot prepare a simple meal.

BREAD

EVERY girl should know how to make bread, even in these days of good, well-managed bakeries. More and more bread making is being done outside the home, and when the conditions are satisfactory this may be a good thing; but every housewife should understand the process of manufacture and the principles which underlie it, so that she may have a standard and know what to demand in quality and care. Many people feel that the ability to make good bread is a test of a girl's skill in cooking, and certainly nothing is more satisfactory than to be able to prepare a wholesome, attractive loaf of bread or a sheet of light, golden brown biscuit. Bread making is not an especially difficult process, but care, patience, and the judgment which comes from experience are needed to make a successful bread maker.

Bread raised with yeast is really lightened by the life process of certain very tiny plants, called yeast plants, which we sow and cultivate in the dough as we set it. If we keep in mind the requirements of larger plants, so far at least as heat conditions are concerned, it will be easy to see why certain things must be always the same in bread making.

BREAD

2 cups of liquid (milk or water or part of each)
1½ tablespoonfuls of butter
1 tablespoonful of sugar
2 teaspoonfuls of salt
1 yeast cake in 3 tablespoonfuls of lukewarm water
About 6 cups of flour

Scald the liquid, whether it be milk or water or a mixture of the two. (Milk makes a whiter, richer, and more nourishing bread, but bread made with water does not dry quite so quickly.) Pour the hot liquid over the butter, sugar, and salt, to melt and dissolve them. Soften the yeast in the lukewarm water. (Lukewarm water is water which feels neither hot nor cold to the finger.) Cool the milk, etc., until it is lukewarm, then add to it the softened yeast. Add the flour, sifted and measured, cutting the last of it in with a knife. (All the flour may not be needed.) When the dough is stiff enough to knead, turn it out on a very clean, floured board and knead with very clean hands or cut with a knife until it is smooth and elastic, so that it springs back lightly when indented with the finger. Put it into a clean bowl, slightly buttered on the bottom, and set it in a warm (not hot) place, to rise. Keep it closely covered while it is rising. When it has doubled in size, put it again on the bread board and knead it until it has no large holes; then shape it in any desired form. Put it into the baking pans and let it rise as before, to twice its size. Then bake until it is a golden brown and does not stick when tried with a clean, fine knitting needle. It will take from forty-five to sixty minutes for a loaf of bread to bake.

Precautions

1. Be sure not to have too much heat at any point in the process of bread making, up to the time of baking. Too little heat makes the rising slow, but too much heat is ruinous.

2. Use as little flour as possible on the board. Too much flour makes the dough hard and tough. Mix the bread as soft as it can be handled.

3. Cover the dough well while it is rising, for three reasons: (*a*) To keep it at a uniform warmth, protected from drafts. (*b*) To keep it clean and protected from dust. (*c*) To keep a hard crust from forming over the top, caused by the evaporation from the surface.

CARE OF BREAD AFTER BAKING

Bread should be cooled at once and rapidly, in a draft of cool, clean air. After it is thoroughly cool it should be put into a clean, cool, dry place, covered well. Pieces of bread, left over, must never be allowed to become moldy in the bread box.

RULES FOR BAKING

(*These rules apply not only to the baking of bread, but to baking in general.*)

Divide the time allowed for baking into quarters.

First quarter. The articles should begin to rise.

Second quarter. The articles should finish rising and begin to brown.

Third quarter. The articles should finish browning.

Fourth quarter. The articles do not change in appearance, but cook through and shrink away from the sides of the pan.

CINNAMON ROLLS

Take ordinary bread dough, and after the first rising is finished, knead until it has no large holes, then roll it out in a sheet about one-half an inch thick. Spread this with butter that has been softened by creaming with a knife, but not melted. Sprinkle with a layer of sugar and cinnamon, mixed together. Use two tablespoonfuls of sugar to one-third of a teaspoonful of cinnamon. Chopped raisins may also be scattered over the cinnamon and sugar. Roll up the dough like a jelly-roll and cut into slices, about three-fourths of an inch thick. Lay the slices in a buttered pan, with the cut sides up. Let them rise to double their size and bake about twenty or twenty-five minutes.

SALADS

NO dish is more attractive than a daintily prepared salad, especially in the summertime when heavy, hot dishes pall upon the appetite. Salads may be very nourishing and suitable for the main dish of a meal or merely an addition to it, according to the kind of salad.

Salads are made up of three parts: the green, fresh vegetable upon which they are arranged, the dressing, and the fish, meat, fruit, or vegetable which gives its name to the salad. Sometimes the dressing is used alone upon the green vegetable, as in dressed lettuce.

Lettuce, celery, parsley, cabbage, dandelion, and water cress are among the common kinds of green vegetables used for salad. They must be most carefully prepared and washed to make sure that they are entirely clean and free from all insect life. After washing they must be carefully dried and chilled before arranging the salad upon them.

French dressing, boiled dressing, and mayonnaise are the most usual forms of salad dressing. They are used for different kinds of salads. Mayonnaise is the richest and most nourishing, on account of the egg and oil contained in it. It is not, however, an extravagant kind of dressing, because it is so rich in food material and the oil makes it particularly wholesome.

FRENCH DRESSING

1 teaspoonful of salt
3 tablespoonfuls of vinegar
¼ teaspoonful of pepper
⅓ cup of olive oil

Mix the dry ingredients and add the vinegar. Stir the oil in, a little at a time, stirring well.

This form of dressing is used for dressed lettuce, dandelions, water cress, and for marinating salads of all kinds. It must be kept stirred during the time of serving, as it tends to separate on standing.

BOILED DRESSING

1 teaspoonful of salt
½ teaspoonful of mustard
Speck of cayenne pepper
2 teaspoonfuls of butter
1½ teaspoonfuls of sugar
1 egg
½ cup of scalded milk
3 tablespoonfuls of vinegar
2 teaspoonfuls of flour

Put the dry ingredients together and stir them into the egg, slightly beaten. Put all the ingredients together, in the top of a double boiler, except the vinegar. Let them cook gently, stirring constantly, until they are thickened. Add the vinegar slowly and continue the cooking until the dressing is creamy. Strain and cool. If the dressing should curdle, beat it with an egg beater until it becomes smooth.

This dressing is especially suited to potato salad, simple vegetable and fish salads, and is liked by some persons better than a dressing which contains oil.

MAYONNAISE DRESSING

¾ teaspoonful of mustard
2 teaspoonfuls of sugar
½ teaspoonful of salt
Speck of cayenne pepper
Whites of 2 eggs
Yolks of 2 eggs
1½ cups of olive oil
2 tablespoonfuls of vinegar
2 tablespoonfuls of lemon juice

Have all the ingredients for the mayonnaise thoroughly chilled before beginning to blend the dressing. Mix the dry ingredients and stir them into the egg yolks. Add one tablespoonful of the vinegar and stir until thoroughly blended. Then add the oil, drop by drop, beating or stirring constantly, until the dressing begins to thicken, which is likely to be when the first quarter of a cup of oil has been added. After the dressing begins to thicken the oil may be added more rapidly without danger of curdling, but the beating must be constant. When the oil has all been added, beat in the whites of egg, already beaten stiff and dry. Chill and use as needed on salads.

The white of egg may be omitted, but it makes the dressing more delicate, lighter, and modifies the taste of the oil.

This dressing is used for chicken, lobster, and fruit salads, or, indeed, for any, when a rich dressing is desired.

POTATO AND CARROT SALAD

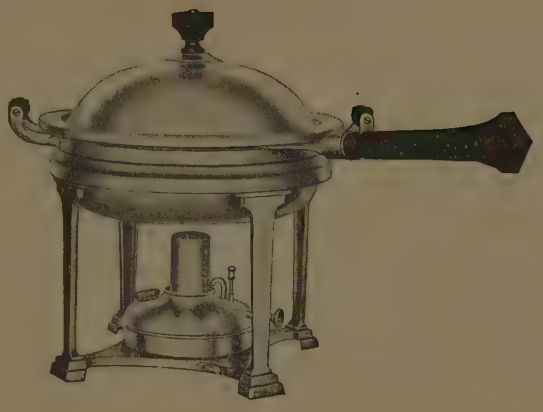
2 cups of potato, boiled, diced, and cooled
1 cup of carrot, prepared as above
2 hard-cooked eggs 1 head of lettuce
Salad dressing

Prepare the vegetables and lettuce. Cook the eggs and prepare them as for "egg goldenrod." Moisten the potatoes with a little French dressing or sprinkle them with salt, pepper, and vinegar. Arrange the lettuce on a bowl or platter, placing the stems towards the center of the dish. Put a mound of the potato upon the lettuce and garnish it with a border of the diced carrots. Pour over it the salad dressing and sprinkle it, in some dainty design, with the chopped yolk and white of the egg.

DATE AND CREAM CHEESE SALAD

Wash and stone the dates. Cut them into pieces and mix them with the cream cheese, which has already been softened with milk, cream, or salad dressing. Arrange the dates and cheese upon heart leaves of lettuce and serve with more dressing.

A dainty and attractive arrangement counts for more in a salad than in any other dish.



CHAFING-DISH COOKERY

THE chafing dish is a useful and often interesting means of preparing many dishes, when used either instead of a large stove or in addition to it. Many things may be cooked sociably at the table instead of in the kitchen. For college girls boarding themselves, for people living alone, and for late evening supper parties, it has many possibilities. The chafing dish need not be an elaborate or expensive one, nor need its owner in order to enjoy its use possess all the spoons, forks, fillers, etc., which may accompany it.

The chafing dish should have a good and easily adjusted lamp, unless one is very patient when hungry. There should be two pans, one called a "blazer," for cooking over the direct heat of the flame, the other for holding hot water, practically making a double boiler. There should always be a metal tray under the lamp of the chafing dish, to prevent injury to cloth on table in case the alcohol is spilled.

Many dishes which are prepared on the ordinary stove may be cooked also in the chafing dish, by the use of either the blazer or the hot water pan with the blazer, according to the heat required. White sauce with many kinds of fish, meat, vegetables, or eggs, eggs in many ways, cheese in the form of rarebit, and candy may all be prepared in the chafing dish. Have everything measured and daintily arranged before beginning the actual cooking, as this makes the work easier, more graceful, and less liable to interruption.

CREAMED CHICKEN

1 cup of white sauce — 1½ cups of cold chicken cut into small pieces
Salt and pepper
Crackers or slices of toast

Prepare the white sauce in the blazer, being careful not to let it burn or become lumpy. Stir into it the cut chicken and heat over the hot-water pan. Season to taste and serve hot on crackers or slices of toast.

CREAMED SHRIMPS WITH PEAS

1 cup of white sauce — 1 can of shrimps
1 can of peas

Prepare the white sauce. Drain the liquor from the shrimps and the peas and stir them into the white sauce. Season with a little allspice, if liked. Reheat over the hot-water pan and serve hot on crackers.

OMELET WITH CHEESE

3 eggs — ½ teaspoonful of salt
1 tablespoonful of butter — Speck of pepper
3 tablespoonfuls of milk

Beat the eggs all together, add the salt and pepper and milk. At once pour it into the butter which has been melted in the blazer. Let it cook gently, lifting at the side and letting the uncooked portion run underneath. When it is firm, fold over and serve, sprinkled with grated cheese.

WELSH RAREBIT

½ pound of mild cheese — ¼ teaspoonful of salt
1 egg — ½ teaspoonful of mustard
Speck of cayenne pepper — ¼ cup of milk
1 tablespoonful of butter

Put the milk into the blazer, with the cheese cut into small pieces. Have the hot-water pan under it. Mix the seasonings with the egg and beat the egg slightly. When the cheese is melted in the milk, pour this liquid over the egg and return the whole to the chafing dish, still cooking it over the hot water. Stir it and let it cook until it is thickened and creamy. Serve hot on crackers. Be careful not to use too much heat, as it is likely to make the rarebit tough and stringy.

CREAM CHOCOLATE CANDY

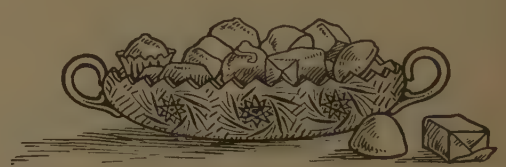
2 cups of sugar — ¾ cup of milk
2 squares of chocolate — 1 tablespoonful of butter
1 teaspoonful of vanilla

Boil together the sugar, milk, and chocolate until the chocolate and sugar are melted. Add the butter and cook, without stirring, until the candy forms into a soft ball, when a little is dropped into cold water. Remove from the heat, cool rapidly, without stirring at all until it is very cool, then add the vanilla and beat until it is creamy and ready to pour into the pan.

BROWN SUGAR FUDGE, WITH PEANUTS

2 cups brown sugar — 1 tablespoonful of butter
⅔ cup of milk — ⅔ cup of chopped peanuts
1 teaspoonful of vanilla

Make this like the cream chocolate candy, adding the nuts with the vanilla. This candy must be boiled a little longer than the cream chocolate candy, that is, the ball must be a little firmer in this case than in that. In both candies one-eighth of a teaspoonful of cream of tartar may be added during the boiling, to make them less likely to crystallize.



OTHER SIMPLE RECIPES

HOT WATER GINGERBREAD

1 cup of molasses — 1 teaspoonful of soda
½ cup of boiling water — 2 teaspoonfuls of ginger
2 cups of flour — ¼ teaspoonful of salt
3 tablespoonfuls of melted butter

Mix and sift together the dry ingredients. Add the water to the butter and stir this liquid gradually into the dry mixture. When thoroughly mixed, add the melted butter and beat well. Bake about twenty-five minutes in a moderate oven.

ORANGE CAKE

Yolks of 2 eggs, well beaten
1 cup of sugar
1½ cups of flour
2 teaspoonfuls of baking powder
¼ cup of water
¼ cup of orange juice

Sift together the flour and baking powder. Beat the yolks of the eggs thoroughly and add to them the water. Add the sugar and then the flour and orange juice, alternately. Cut or fold in a part of the stiffly beaten white of the egg just at the last, before putting the cake into the baking pan. Bake about twenty-five minutes in a moderate oven. The remaining white of egg may be thickened with confectioner's sugar and flavored, then spread upon the cake as frosting.

CREAM CAKES

1 cup of hot water
⅓ cup of butter
3 eggs
⅛ teaspoonful of salt
1 cup of sifted flour

Let the water and butter come to the boiling point, then stir in the flour and salt and stir until it is a smooth paste, boiling it all the time but being careful that it does not burn. Let it cool, then add the eggs, unbeaten, one at a time, beating each one into the mixture before adding the next. Beat thoroughly, then shape by teaspoonfuls on a buttered pan or tin sheet. Do not put them too near together, as they spread a little in rising. Cook them about twenty-five minutes in a fairly hot oven. When baked, remove from the tin, and with a sharp knife cut open and fill with whipped cream or with any desired filling.

CREAM CAKE FILLING

1 cup of milk
⅓ cup of sugar
1 egg
4 teaspoonfuls of flour
½ teaspoonful of flavoring
Speck of salt

Scald the milk, leaving about two tablespoonfuls cold. Mix the dry ingredients and stir them to a smooth paste with the cold milk. Pour the scalded milk over this paste and cook until it thickens and is free from any starchy taste. Beat the egg slightly and pour the milk, etc., over it. Cook over hot water until it thickens smoothly. Remove from the heat, add the flavoring, strain, and cool.

The cream cakes are very good filled with crisp heart leaves of prepared lettuce which have been spread with either boiled dressing or with mayonnaise.

ICE CREAM

Ice cream is one of the most attractive and useful dishes, when properly used. It is not wholesome when eaten at the end of a heavy and elaborate dinner, after digestion has begun, since the chill of it may cause delay or even cessation of this process; but when eaten slowly, with simple food, it is refreshing and nourishing. Home-made ice cream, carefully prepared from clean and wholesome materials, is not to be placed under the ban, just because cheap ice cream, served in cones and sold in questionable places, is full of possible dangers.

Ice cream may be prepared in a real freezer or in one improvised from a pail and a bowl or from a baking powder can and a bowl. The principle of the freezing mixture, rock salt and ice, is the same in both cases. The ice must be chopped rather fine and must be mixed in layers with the rock salt. The salt melts the ice, which, in melting, steals heat from the nearest surfaces. These are, of course, the can of the freezer, packed within the ice and salt, and the tub of the freezer, which, being usually of wood, is a poor conductor of heat.

GENERAL RULES FOR FREEZING ICE CREAM

1. See that the freezer is clean and in working order, before beginning.
2. Have the ice chopped and the rock salt ready.
3. Prepare the mixture to be frozen and pour it into the can of the freezer.
4. Put the freezer together and pack it with the salt and ice. Use three or four times as much ice as salt. Begin with a layer of ice, then a layer of salt, and so continue until the freezer is packed above the level of the mixture within the can. Turn the crank occasionally during the process of packing.
5. Turn the crank slowly and evenly.
6. Add more salt and ice if needed. Do not pour out the water unless there is danger

of getting it into the ice cream. This water is the coldest thing about the salt and ice, and really does the freezing.

7. Remove the dasher and pack the frozen mixture down into the can. Put back the cover, pack with more salt and ice, and let it stand before serving.

8. In removing the can from the freezer and the cream from the can, be very careful that no salt is scattered into the cream. The can must be carefully wiped; and, if the ice cream sticks, the outside of the can may be wiped, quickly, with a clean cloth wrung dry out of hot water.

FRUIT SHERBET

1 orange
1 lemon
1 cup of berries
1 banana
1 cup of sugar
1 cup of water

Wash and squeeze the orange and lemon, using the tender pulp of the orange as well as the juice. Mix the sugar and water and add them to this juice. Peel the banana and scrape it with a silver knife. Press it at once through a coarse strainer into the juice and water, to keep it from discoloring in the air. The berries may be omitted, but, if they are used, wash them and mix with the other ingredients. Freeze by the general rule.

ICE CREAM

2 cups of cream
⅔ cup of sugar
1½ teaspoonfuls of vanilla
Speck of salt
⅔ cup of milk

Mix the cream, milk, salt, and sugar. Add the vanilla. Freeze by the general rule. This may be varied by adding two-thirds of a square of chocolate, melted, for chocolate ice cream; one-third of a cupful of caramel sirup for caramel ice cream; or crushed strawberries or raspberries, using about one cupful.

ICE CREAM FOR ONE, WITHOUT A FREEZER

A baking powder can, absolutely watertight, and a bowl make a substitute for a freezer. It is most useful for an invalid, in hot weather. Pack it as you would a large freezer, being careful constantly that the can does not rise in the mixture of salt and ice. Turn the can with your hand after it is packed and now and then remove the cover and scrape the material down as it freezes against the sides. This hastens the freezing and makes the ice cream more even in consistency.

VANILLA ICE CREAM

½ cup of cream
2 teaspoonfuls of sugar
¼ teaspoonful of vanilla

Scald the cream, dissolve the sugar in it; cool it and add the vanilla. Chill and freeze.

CARAMEL ICE CREAM

½ cup of cream
2 teaspoonfuls of sugar
1½ tablespoonfuls of caramel

Scald the cream and dissolve the sugar and caramel in it. Chill and freeze.

LEMON ICE

½ cup of water
3 tablespoonfuls of sugar
2 tablespoonfuls of lemon juice

Boil the sugar and water together and strain into this sirup the lemon juice. Chill and freeze.

FIRELESS COOKING

FIRELESS cooking sounds like a contradiction — an impossibility; but think of the comfort and convenience of it on a hot day, or when one wishes for any reason to be away from home. The Norwegian "haybox" was the forerunner of the present more elaborate "fireless cooker," with all its pretty aluminum kettles and easily adjusted parts.

Everything cannot be cooked in a fireless cooker, but dishes such as cereal, stewed fruit, and vegetables, braised meat, and fish cooked in water are perhaps better cooked in this way than in the usual manner. Foods that require high heat for a short time, such as toast, crisp fat of meat, and bread or muffins must still be cooked in the oven. The principle of the fireless cooker is that the heat is retained by a non-conducting medium, so that the cooking is carried on after the direct heat of the fire is removed. This means the utilization of heat which usually escapes

and is wasted, through radiation from the kettle and the loss of steam.

If you have a real, bought fireless cooker, follow the directions carefully and, with your knowledge of the principles of cookery, you will be able to use the cooker successfully. If you wish to prepare a cooker at home, you must begin with a wooden box or old trunk which can be tightly closed with a hinged and fastened cover. The kettle must be at least two inches smaller in every dimension than the box in which it is to stand.

The kettle must have a cover which fits securely. Good agate-ware or aluminum are the best materials for the kettle. Aluminum costs more to begin with but is most durable.

The box may be packed with hay, excelsior, paper, etc. Some packing, such as wool and sawdust, must be covered to keep them in place.

TO PACK THE BOX

1. Line the box and the cover with several thicknesses of newspaper.
2. Make a thick layer of newspapers at the bottom of the box.
3. Place the kettle on this pad, in the space where it is to stand, and pack it tightly with newspapers or other packing material. When the kettle is taken out, it will leave a nest just right to slip it into next time.
4. Make a bundle of papers to fit the top firmly.
5. If on using, the packing material shrinks from the box or kettle, add more papers to keep the space firmly filled.

HOW TO USE THE COOKER

1. Do not try to prepare too small a quantity in the cooker, as it loses heat more rapidly in proportion than a larger amount.
2. Have the cooker open and everything in readiness near the stove. Heat your cereal, stew, fruit, or other material, to the boiling point and then, when it is *all* thoroughly boiling, put on the cover tightly and transfer it quickly to the nest in the cooker. Close the cooker at once and do not open it again until the time of removing your dish. If you do, it will be necessary to reheat your food, since so much heat will be lost that the cooking cannot continue.

CREAM OF WHEAT MUSH

4 cups of boiling water
1 teaspoonful of salt
¾ cup of cream of wheat

Mix the salt and boiling water, then scatter in the cream of wheat, and boil five minutes. Put it in the cooker and cook at least two hours. It may cook ten or twelve hours.

OATMEAL

½ cup of oatmeal
¾ cup of cold water
½ teaspoonful of salt
2½ cups of boiling water

Soak the oatmeal in the cold water for several hours. Add it to the boiling, salted water and let it boil ten minutes, uncovered. Place it in the cooker and cook over night, or about ten hours.

STEWED PRUNES

Wash the prunes *very* carefully, then soak them in cold water over night, if possible. Put them on to boil in the same water in which they were soaked, and let them boil five to ten minutes. Add about one tablespoonful of sugar for each cup of prunes, or more if liked. Then put them into the cooker and cook about eight or ten hours.

Apricots may be cooked in the same way except that they may not require so long a time, and must not be allowed to break.

CORN CHOWDER

1 inch cube of fat salt pork
4 good-sized potatoes
1 quart of milk
½ box of oysterettes
1 onion
1 can of corn
Salt and pepper
2 tablespoonfuls of butter

Cut the pork and onion into small dice and fry them together. Prepare the potatoes, cut them into dice, and parboil them five minutes to remove the bitter taste. Put the milk, potatoes, corn, and seasoning into the cooker with the onions and pork, and cook two hours.

ITALIAN STEW

5 tablespoonfuls of olive oil
1 onion
4 good-sized potatoes
1 can of tomatoes
1 can of peas
Salt and pepper

Cook the onion, cut into dice, in the olive oil until it is light brown. Add the tomatoes and peas and the potatoes, cut *very* thin. Season and let boil five minutes. Transfer to the cooker, and cook three or four hours. Macaroni broken into pieces may be substituted for the potato, and dried mushrooms may be added if liked.

LUNCHEONS FOR SCHOOL, TRAVELING, OR PICNICS

EVERYBODY likes a dainty, satisfying luncheon when one must be carried to school or on a railroad journey or to a picnic ground. And it is not an entirely simple matter to arrange one which will keep its attractiveness after it has been jolted about for some hours. The food must be chosen carefully, so that it may not be too perishable. The way of packing, too, is very important. Never try to pack and carry food which may really spoil on a long, hot trip. Never pack food in such a way as to make it too heavy or bulky for easy carrying.

Have a drawer or shelf, somewhere, in which to keep, in a neat and handy fashion, the papers, string and clean boxes which may be useful for arranging luncheons. With these it is well to have, also, drinking cups, paper plates, paper napkins, common forks and spoons, and little glass or porcelain jars such as jam, cheese, etc., come in. Then, when someone suddenly decides to go for a journey, or an unexpected invitation comes to join a

A BASKETRY CLASS HAVING A PICNIC

picnic party, you are prepared to pack your luncheon comfortably, quickly, and daintily.

SANDWICHES

Sandwiches may well be the chief part of most luncheons. They can be carried well, are very nourishing, and may be prepared in any number of kinds, by varying the filling. The bread should not be too fresh to cut well and should be cut into slices as thin as they may be without breaking when spread with the butter and filling. Soften the butter with a silver knife, until it is light colored and creamy. Spread one slice of bread with butter and the next with the sandwich filling, being very careful to keep the slices in pairs, so that they will fit evenly together. Do not cut off the crusts, unless you are preparing the sandwiches for an afternoon tea, where you wish them to be particularly delicate. The crust is almost the best part of the bread.

The filling for sandwiches may be chopped meat with butter or salad dressing, chopped egg with salad dressing, cream cheese softened with milk or cream or salad dressing and mixed with chopped olives, raisins, or nuts. Lettuce leaves, freshly washed and dried, may be spread with salad dressing and laid between the slices of bread and butter. These must be eaten soon after they are prepared, as the lettuce wilts quite quickly. Jelly sandwiches, or jelly mixed with chopped nuts, are refreshing in a luncheon where there is perhaps little to drink. When the sandwiches are done, wrap each in paraffine paper and then wrap the whole package in stout paper or pack in a box by itself.

STUFFED EGGS

Cook the eggs hard by placing them in water that is boiling, then at once lowering the heat to just below the boiling point and letting them cook for thirty minutes. Remove the shell and skin and, cutting them in halves, lengthwise, remove the yolks without breaking the whites. Mash the yolks with a little salad dressing or mix them with deviled ham or butter, salt and pepper, then shake into balls and fit them back into the empty whites. Lay the halves together and wrap each egg securely in paraffine paper.

If your picnic is out-of-doors in a place where you can have a fire or even an alcohol stove, it will add very much to your pleasure to cook something on the spot. Coffee is as simple as anything to prepare and almost everyone likes it at an out-of-doors fête, even if not at home.

COFFEE

Put in a cheesecloth one tablespoonful of coffee for each cup you wish to have. Tie the cheesecloth securely, but do not have it tight, as the coffee swells when it is soaked. Put the coffee, thus arranged, in a coffee pot or pail and cover it with cold water. Let it stand a little while and then pour over it one cup of boiling water for each tablespoonful of coffee, except one. (That one tablespoonful is to allow for the cold water in which the coffee was soaked.) Let it boil three minutes, then let it settle five minutes, where it will keep hot but no longer boil. Serve hot with sugar and cream.

Soup may be heated over the fire, or eggs may be cooked. Be very careful that you never try to make a fire in the open unless you have a perfectly safe place to make it in. Never start one in dry or windy weather. Forests are too precious to be hazarded for the mere pleasure of a picnic fire.

A thermos bottle is a great convenience and comfort in carrying hot or cool beverages on a train, for one or two persons. A pail may be arranged so that hot or cold food or drink for a larger number may be carried to a picnic. The principle is that of the fireless cooker. Food may not, perhaps, be cooked in this pail, which can easily be arranged cheaply at home, but it can be kept at an agreeable temperature for some hours. There must be two pails, each with a securely fitting cover, and the outer one must be about two inches larger, in each dimension, than the inner. The space between the two pails must be firmly packed with newspapers, excelsior, or hay; the bottom and top of the inner pail must also be solidly protected by layers of newspaper or other packing. If the inner pail, after being filled and tightly covered, is heated to the boiling point and at

once packed into the space already prepared, the food will remain very hot if not actually cooking. Ices, packed in the same way, will keep for a long time, protected by the layers of newspaper. It is well to have the outer pail wooden, if possible.

When you have finished your luncheon pick up and safely bury every scrap of rubbish, egg-shells, fruit skins, paraffine paper, etc., which may have escaped during your eating. Leave your picnic ground as dainty as you would like to find it, so that the wood-lovers, both fairy and human, will not regret that you came and will welcome your return.

HOUSEKEEPING

"The woman's work for her own home is to secure its order, comfort, and loveliness."—JOHN RUSKIN.

A GIRL'S OWN ROOM

THE first bit of housekeeping intrusted to a girl's care is usually her own room; then, when she has learned to keep that in dainty order, some other parts of the house may be allotted to her responsibility, until she has become acquainted with every side of housekeeping.

A girl's own room should be, so far as possible, an expression of her own taste. The furniture may be of the simplest, yet it should be carefully arranged and well cared for. There should not be too many knickknacks about, to catch dust and make the matter of keeping tidy too difficult.

BED-MAKING

1. When you get up in the morning, at once open the bed and spread the bedclothes over the footboard and chairs. Open the windows, closing the door in winter to keep the rest of the house from becoming cold.

2. After breakfast, when the bed has aired thoroughly, make it up neatly. Turn the mattress at least every other day, then lay the pad straight and smooth upon it. Always arrange the sheets with the wide hem at the top of the bed and the right side towards the sleeper. Tuck the lower sheet in at the top, very firmly, and the upper one in at the bottom so that it will not pull out. Do not let any wrinkles remain in either sheets or blanket. Turn the sheet down at the top to cover the blanket edge and lay the spread smoothly over all. Tuck it in along the sides or let it hang down, according to the kind of bed; then shake up the pillows and lay them smoothly in place.

KEEPING IT IN ORDER

Hang up your clothing, if any is not in its place. Put away your shoes and arrange anything about the room which has been left in disorder. Make your closet tidy each day and then it will seldom need a thorough overhauling. Put your bureau drawers in neat order and keep your belongings in place by means of open boxes, which will fit into the drawer and separate handkerchiefs from gloves and so on. It is better to "keep it tidy" than to set it to rights only every now and then.

Wash your toilet articles every morning and dry them, being especially careful about your soap dishes. Arrange the things on your bureau and do not leave pins, brush and comb, or other things, lying about.

Dust your room and arrange your table and desk or sewing table. A room which is well cared for is very attractive and inviting even though plain. Your own room is your "home in your home."

THE BATHROOM

No room in the house should be more neat than the bathroom, and a little care will keep it constantly in order. In the morning shake the rug and wipe up the floor, then dust the woodwork carefully. Scrub the tub and bowl with some scouring soap which will not scratch, and rinse them thoroughly with hot water. Be sure that no gray ring is left. Scrub the top of the washstand and clean the faucets, but be careful, if they are of nickel, not to use a powder that will scratch them. Usually hot water and soap will be enough, but silver polish may be used if necessary. Clean the toilet with a brush made for that purpose, or with a roll of stiff paper that may afterward be burned. Take away the used towels and put out fresh ones. Be especially careful to see that the soap dishes are clean and dry.

THE LIVING ROOM, PORCH, AND HALL

The first thing in the morning, when you go downstairs, open the front door and let it remain open while you sweep the porch. This will freshen the air throughout the house and insure an attractive, tidy entrance from early morning. Shake out the small rugs in the hall and wipe up the floor, if it is bare, with a dry mop. Dust the hall furniture and set it in order.

THE DINING ROOM

Before beginning to get breakfast, open the dining room windows. Wipe up the floor and brush the rug or carpet, if necessary, to remove crumbs. Dust thoroughly; then close the windows and lay the table.

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PRACTICING BED-MAKING AT SCHOOL

If the living room is put in order every night just before bedtime, it is easier to take care of next morning. Carry away old newspapers, arrange books and magazines, brush up the carpet or shake rugs and wipe up the floor, and dust each piece of furniture. Remove any faded flowers, wash the vases, and replace with fresh bouquets, if you can. Clean and fill the lamps if they are used. Be sure, too, that the living room is well aired. At least once a day the windows should be opened and a free draft of air should be allowed to enter and wash out every trace of the air which has been lingering in the corners and hangings. At all times, it is well to have fresh air entering, at least by a window-board.

Every family makes its own rule for table setting, since this must vary according to the time, place, and means at hand. Absolute cleanness and order, however, will make the simplest linen and china very dainty and attractive, even if it is not arranged according to the latest fashion. Convenience in serving and eating should be the foundation for table arrangements. If flowers are used on the table they should be fresh and daintily arranged. Never use too large a bouquet, as that is inconvenient in many ways.

Table setting may vary in kind and in elaborateness from this simple little Japanese table

to one loaded with flowers, candles, and ribbons, such as we see sometimes in foreign cities. I think we all prefer simplicity and daintiness, which approaches the Japanese ideas, though we may require more dishes and different arrangements from theirs.

RULES FOR SETTING THE TABLE

1. Dust the table carefully.

2. Lay on it the silence cloth and tablecloth, or the runners or doilies. Runners and doilies are more easily kept fresh and dainty.

3. Put the knives and spoons at the right of each person's plate, turning the knife edge towards the plate and laying the spoons to be used in order, so that the outside one is taken first. The forks are placed at the left, in the same order.

4. Put the tumbler at the right hand, at the end of the knife. The bread and butter plate and napkin should be placed at the left.

5. Cocoa, coffee, or tea should be served at the mother's place. Arrange the sugar bowl and cream pitcher in front of her, with a bowl for dregs, and with a tile for both the hot-water pot and the cocoa pitcher or coffee or teapot. The hot water should be on the left, the beverage on the right. Cups and saucers with spoons should be set at hand as conveniently as possible.

6. Opposite the hostess, arrange a place for serving the breakfast or luncheon dish, with a mat of some sort to prevent the heat from injuring the table, and with spoons, knife and fork, and plates suitable to the kind of food to be served.

THE KITCHEN

The kitchen should be one of the most attractive and inviting rooms in the whole house. Its charm consists almost wholly in its cleanness and its simplicity. The kitchen should be a light, well-aired room, both for the comfort of people who work in it and because sunshine, light, and air keep things sweet and clean. Here, as in other parts of the house, care in keeping things dainty will save you a great deal of trouble in making them clean again if you should at any time be careless. Wipe spots from the floor before they have time to stain, and brush up crumbs and litter as soon as they are scattered.

RULES FOR DISH WASHING

1. Have plenty of hot, soapy water.

2. Have plenty of clean towels.

3. Gather up the dishes and scrape off any scraps. Grease may be rubbed off with a piece of soft paper that can be thrown away. This is especially necessary in the country or in a camp where water is not too plentiful or must be carried a distance.

4. Soak dishes which have held eggs, milk, or dough in cold water. Soak dishes which have held sugar, fat, or gelatine in hot water.

5. Wash all dishes both inside and outside. Rub any rough or burned spots with Sapolio. The worst burned spots may be readily removed with a small bit of steel wool, that may be bought at the hardware store.

6. Rinse the dishes carefully in very hot water and wipe entirely dry, holding them in the towels so that your fingers do not make dull marks upon them.

7. Wooden, celluloid, or ivory knife and fork handles must not be left in hot water. Do not wet the egg-beater above the wheels, as the oil is washed away and the egg-beater will be very hard to run.

CARE OF TOWELS

Wash the towels out in hot, soapy water after each meal. Once a week they should be sent to the laundry. They need not be ironed, but stretched smooth and even. Some people prefer unironed towels and bed linen as seeming fresher and softer than when ironed.

A MODEL KITCHEN, SHOWN IN A SCHOOL

THE SINK

Keep the sink like a big dish, never allowing anything to accumulate or become disagreeable in it. Then the work is never unpleasant.

1. Remove any scraps which may have fallen into the sink.

2. Clean the sink thoroughly with Sapolio or any good sand soap and a brush.

3. Rinse thoroughly with hot water.

4. Scald the sink drain thoroughly, and once a week pour down a solution of hot washing-soda. Wash the soda down, in its turn, with plenty of hot water.

5. Wash out the dish mop or dishcloth and wring it very dry; then dry it in a draft of fresh air. Wash the sink cloth and air it. Keep cloths for their own uses and never use them interchangeably.

CARE OF THE STOVE AND FIRE

Sometimes you may wish to make a fire. This is a necessary and useful part of housekeeping and cooking, but be always careful that you understand what you are about, for the fire which is so good a servant in skillful hands becomes a most terrible master if you are careless. In every kitchen there should be some woolen rug or table cover or blanket, to wrap about any person whose clothing might take fire, so as to smother the flames. The very worst thing for the endangered person to do in such a case is to run, for this fans the flame, which might at first be easily put out. If alone, lie down at once, as this keeps the flame away from the face, and then roll over and over, towards a rug, if one is near. The rolling itself helps to put out the fire. At bonfires this

might be done on the grass, but children should wear woolen clothing at bonfires and should be taught never to play with matches or with fire in any form. It is not unsafe to learn to build a fire in the stove, if you take care, and it is an important thing to understand.

1. See that the grate of the stove is empty and clean.

2. See that the drafts are arranged properly for starting the fire: check draft closed, other drafts open.

3. Lay the fire, first using shavings or crumpled newspapers, then soft, light wood.

4. Brush the dust and chips off the top of the stove; also brush out the oven and brush around the stove.

5. Blacken the stove.

6. Light the fire, from underneath the grate.

7. Polish the stove while the fire is kindling. Begin to rub on the front covers.

8. When there is a good wood fire, add coal carefully; and close the oven draft, when the coal is beginning to burn without smoke and gas.

9. Add more coal, and close the front draft and chimney draft to keep the fire.

CARE OF THE ICE CHEST

As often as twice a week, take everything out of the ice chest and wash it thoroughly inside with warm water in which there is a little soda. Once in a while, when the ice chest is empty and you can spare time for it to cool, scald it out with boiling water and pour hot soda solution into the drain. Never allow anything to spoil or to be spilled in the ice chest. Keep no strong-smelling things, such as cheese, fish, or onions, where they can give a disagreeable taste to milk, cream, or butter.

CARE OF FOOD

Put away food at once, when it is brought in from the market or when a meal is over. Milk and cream must be taken in as soon as the milkman brings them and be placed at once on the ice. If you have no ice, stand the jars in cold water and cover them with a wet cloth which dips into the water. In this way the cloth will remain wet and the evaporation from its surface will keep the jars cold. Wash eggs when they come in and put them away. Cover everything very carefully from dust and flies, — but don't have any flies!

SWEEPING AND DUSTING

Before beginning to sweep, dust and remove small ornaments, or cover them in the room. Use some moist thing, such as wet tea-leaves or pieces of wet newspaper, to keep the dust from flying as you sweep. Keep the brush close to the floor and sweep with long, even strokes, with the nap of the rug or carpet. Shake small rugs or brush them out-of-doors. After sweeping, with a soft cloth or dustless duster wipe off the pictures and woodwork. Then bring back and rearrange the ornaments and furniture which you dusted beforehand. Never use a feather duster. It is an "abomination," which only stirs up dust for people to breathe, without removing it, so that later it settles again and the work is worse than wasted.

METAL CLEANING

1. Silver should be rubbed with a good silver cream or powder. It must *never* be touched with anything which can scratch it. Polish it when the powder is dry, then wash it in clean hot water.

2. Steel may be scoured with Sapolio or Bristol brick. Put it on with a wet cork. Wash and dry the article, as steel rusts if left at all damp.

3. Copper and brass may be cleaned with salt and vinegar, with rotten stone and oil, or with a good brass polish.

4. Nickel should be washed with soap and hot water and, if that is not sufficient, cleaned like silver. It must not be scratched.